Proceedings of the 1st Joint Meeting of the 12th National Symposium on Forest Parasites and the 54th Western Forest Insect Work Conference (WFIWC)

Memorias de la Primera Reunión Conjunta XII Simposio Nacional de Parasitología Forestal y 54ava Conferencia de Entomología Forestal del Oeste

Guadalajara, México
November 3-6, 2003

Enhancing our Partnerships
Fomentando Nuestra Colaboración

Western Forest Insect Work Conference

SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES | SEMARNAT

CONAFOR
COMISION NACIONAL FORESTAL

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2:00-3:30	WFIWC Executive Meeting / WFIWC Reunión de Alternos	**Salón Orquídea**
4:00-5:00	WFIWC Initial Business Meeting / WFIWC Reunión de Negocios	**Salón Orquídea**
7:00-9:00	Welcome Reception / Recepción de bienvenida	**Salón Lila**

Tuesday, November 4 / Martes, 4 de Noviembre

7:00-8:00 Registration
/ Registro

8:00-9:00 Welcome (e.g. dignitaries, Chairs of groups, etc.)
/ Inauguración y Bienvenida
Salón Stelaris Moderator / Moderador – Jaime Villa

9:00-10:00 WFIWC Founders Award
/ Premio Fundadores de la WFIWC
Salón Stelaris Moderator / Moderador – José Negron

10:00-10:30 Break / Receso

10:30-12:00 Panel: Fostering Partnerships – success stories of cooperation
/ Ponencia Magistral: Fomentando Nuestra Colaboración – ejemplos exitosos
Salón Stelaris Moderator / Moderador – Jorge Macías

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/ Presentaciones Estudiantiles: Sesiones Concurrentes
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/ Innovaciones en el Uso de Químicos para el Manejo de Descortezadores
Salón Magnolia Moderator / Moderador: Jesús Cota
3. Insect Biodiversity and Community Structure in Forests
/ Biodiversidad de Insectos y Estructura de las Comunidades Forestales
Salón Jazmín Moderator / Moderador: Enriques Montes de Oca

6:00-7:00 Poster Session (authors present) / Exposición de Carteles (autores presentes)
Salones Azalea y Gardenia

7:00-9:00 Silent Auction and Ice Cream Social
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Salones Azalea y Gardenia

Wednesday, November 5 / Miércoles, 5 de Noviembre

8:00am – 7:00 pm Field trips/ Recorridos de Campo

a. Tapalpa
b. Nevado de Colima

Thursday, November 6 / Jueves, 6 de Noviembre

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Salón Stelaris Moderator / Moderador: Jaime Villa

10:00-10:30 Break / Receso

GROUP PHOTOS / FOTOS DEL GRUPO

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5. Molecular Biology in Forest Entomology / Contribución de la Biología Molecular a la Entomología Forestal
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1:00-2:30 Panel: Risks associated with Exotic Species / Ponencia Magistral: El Riesgo que Representan las Especies Exóticas
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2:30-3:30 Break / Receso

3:30-5:00 Concurrent Workshops / Sesiones Concurrentes

7. Plantation Pest Management: Contrasting tropical and temperate pest problems / Manejo de plagas en Plantaciones: Comparación de Plagas en Bosques Tropicales y Templados
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8. Latest Trends in Research and Management on Bark Beetles / Avances en la Investigación y el Manejo de Descortezadores
Salón Magnolia Moderator / Moderador: Ron Billings
9. Current Status on Forest Insects in the Western United States, Canada, and Mexico / El Estado Actual de los Insectos Forestales en el Oeste de Los Estados Unidos, Canada, y México
Salón Jazmín Moderator / Moderador: José Negron

5:30-6:30 WFIWC Final Business Meeting / CEFO Reunión de Negocios **Salón Orquídea**

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7:00-9:00 Banquet Dinner / Banquete de Gala **Salones Dalia y Lila**

Presenters and Abstracts
Presentadores y Resúmenes

Tuesday, November 4 / Martes, 4 de Noviembre

8:00-9:00 **Welcome / Inauguración y Bienvenida** **Salón Stelaris**

Moderator/Moderador – Jaime Villa, Gerente de Sanidad Forestal, CONAFOR

- Rob Mangold, USDA Forest Service, Director of Forest Health Protection, Washington D.C., USA
- Francisco García García, Director General de Gestión Forestal y de Suelos, en representación del Ing. Alberto Cárdenas Jiménez, Secretario de la SEMARNAT, México, D.F.
- Roberto Vargas Maciel, Director General Adjunto, en representación del Ing. Manuel Reed Segovia, Director General CONAFOR, Guadalajara, México

ALSO/ TAMBIÉN:

- Oscar Estrada, Coordinador General de Conservación y Restauración de CONAFOR, Guadalajara, México.
- José Negron, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado, USA
- Eleno Felix Fregoso, Director Centro Universitario de Ciencias Biológicas y Agropecuarias, División de Ciencias Agronómicas, Universidad de Guadalajara, Zapopan, México

9:00-10:00 **WFIWC Founders Award / Premio Fundadores de la WFIWC** **Salón Stelaris**

Moderator/Moderador – José Negron

John Schmid, Retired USDA Forest Service, Rocky Mountain Research Station

The Founders' Award is given to an individual who has made an outstanding contribution to forest entomology in the western United States and Canada. The award recognizes significant contributions in pest management, extension-consultation, research, and teaching.

John M. Schmid worked as research entomologist for the USDA Forest Service at the Rocky Mountain Research Station from 1966 to 1991. He primarily focused on the biology, ecology, and management of spruce beetle and mountain pine beetle, but also worked extensively on western spruce budworm, pandora moth, and other seed and cone insects affecting ponderosa pine. Following his retirement from the Forest Service in 1991, John has remained active in mountain pine beetle work which continues in the Black Hills. He has also maintained active participation at annual WFIWC meetings. John has authored or coauthored over 80 publications, including 29 papers in refereed journals and 42 RMRS publications. His publication, "Spruce Beetle in the Rockies," written in 1977 with R.H. Frye, is still the most comprehensive source of information available on spruce beetle. He has long been active in WFIWC as well as other professional societies and organizations--making dozens of formal presentations and chairing workshops, panels, and field trips.

El premio Fundador se le otorga a una persona quien ha realizado contribuciones sobresalientes en el campo de entomología forestal en el oeste de América del Norte. El premio reconoce contribuciones significativas en manejo de plagas, extensión, consulta, investigación y enseñanza. John M. Schmidt trabajó como entomólogo de investigación para el Servicio Forestal del Departamento de Agricultura de Estados Unidos en la Estación de Investigación de las Montañas Rocallosas desde 1966 hasta 1991. Sus áreas de enfoque principal fueron la biología, ecología, y manejo del descortezador del encino y el escarabajo montañoso del pino, pero también trabajó extensamente con el gusano del terminal del encino, la alevilla Pandora, e insectos de conos y semillas en pino ponderosa. Posterior a su retiro del Servicio Forestal en 1991, John se ha mantenido activo con trabajos con el escarabajo montañoso del pino que continua en los "Black Hills". John ha sido autor o coautor contribuyente en más de 80 publicaciones incluyendo 29 en revistas científicas referidas y unas 42 publicaciones de la Estación Experimental de las Montañas Rocallosas. Su publicación titulada: "Spruce beetle in the Rockies" (El Descortezador del Encino en las Rocallosas) publicada en 1977 con R.H. Frye, sigue siendo el tratado mas completo de información sobre este insecto. Por mucos años el ha seguido muy activo en la WFIWC, conduciendo presentaciones formales, como organizador de talleres de trabajo, paneles de discusión y recorridos de campo.

The Founders' Award Address / La Presentación del premio Fundador

Twenty five years of forest insect research and related events

John Schmidt
Retired USDA Forest Service
Rocky Mountain Reserch Station

Buenos días, amigos míos. Es un honor inmenso recibir el Premio de "Founders" de la Conferencia de Insectos Forestales del Oeste y ser considerado con los distinguidos señores McGregor, Amman y Safranyik.

La Conferencia ha sido muy generosa en presentar a mí este premio. Generosa porque la mayor parte de mi productividad ha sido a raíz de la colaboración y la asistencia de muchas personas en el Manejo de la Sanidad Forestal y la Estación Experimental donde he trabajado en las Montañas Rocosas. En el espíritu de sus contribuciones y sus colaboraciones, acepto este premio.

Como ustedes saben, el premio no lleva ningún beneficio monetario al recipiente. Por lo tanto, quería iniciar una política nueva respecto de este premio. Cada miembro de la Conferencia debe proporcionar al recipiente del premio cien dólares como testimonio del respecto que llevan para el recipiente. ¿Están de acuerdo con la nueva política que propongo? Bueno, muchas gracias, mis amigos.

I apologize to all those fluent in Spanish for that butchered rendition of my introduction. What I tried to say in Spanish is that I am honored to receive the Founders Award and be considered with the likes of McGregor, Amman, and Safranyik. I am somewhat undeserving of the award because much of my productivity has been due to the collaboration and assistance from colleagues in Forest Pest Management and the Rocky Mountain Forest and Range Experiment Station. Further, as you know, the Founders Award carries with it no monetary compensation. Therefore, I am instigating a new policy. Each member of the conference will give the Founders Award recipient $100. Thanks you very much!

My attendance at WFIWCs has been infrequent and sporadic since retirement. Similarly, contacts with my U.S. Forest Service (FS) colleagues have been infrequent and sporadic. Nevertheless, changes in the WFIWC conference and life in the Forest Service have been noticeable. When I have talked with my former FS colleagues in recent years, I come away with the feeling that many are disappointed and frustrated with their work. One friend used the term "upside down" to express his concept of FPM in his region. Another said "I spend most of my time working on legal matters." And while "gridlock" and "paralysis by analysis" are frequently heard, my favorite is "stand and stare management." Judging by what I see of and hear about bark beetle conditions in the west, "stand and stare management" appears to predominate. And the fun seems to be disappearing from forest entomological work. With this in mind, I would like to present a brief summary of my FS tenure, some accomplishments, and events during the course of that time that made the work enjoyable, worthwhile, and memorable.

I began work with the Rocky Mountain Forest & Range Experiment Station (RM) as a summer assistant to W.F. McCambridge in 1963. Mac, or the old duff as his close associates called him behind his back, could be a tough S.O.B. on occasion. In those days, competition for summer jobs was substantially less than it is today, and employment was often a matter of contacts. Dr. Fred Knight had worked at the RM Station from 1950 to 1960, and had continued his friendship and contacts with entomologists at RM after leaving. Whenever the insect project at RM had summer jobs available, they would contact Dr. Knight and ask if he had any good candidates for the job(s). Because Dr. Knight valued these job opportunities for his students, he cautioned me about performing well during my employment and told me not to screw up or I could lose this opportunity for future students. Little did I know that working for McCambridge might be a formidable task.

During that summer, Mac was studying the emergence and attack behavior of the mountain pine beetle (MPB) near Allen's Park, a site south of Estes Park, CO. We had placed emergence cages on infested trees and attractants on green trees. Specific zones on the boles of the trees to be attacked had been delineated with string and I was to count the number of beetles emerging in the cages and the number of attacks between the string lines at specific times each day. I understood that I was to count the attacks between string lines for each zone but didn't know that I wasn't supposed to count the attacks in the areas between zones. As luck would have it that summer, the weather conditions were not ideal for beetle emergence. Each day during the start of the emergence period, the clouds would start to build around 10:00, by 11:00 it would be overcast, and by noon it was pouring. The rain didn't last all afternoon but lasted long enough to drop temperatures and shut off emergence. Despite the rain, I counted beetles and attacks---both within the zones and between zones. I worked for about 10 days on the study and then turned in the data to Mac after being relieved. I started a special assignment thereafter so I didn't see Mac again until just before I left to return to school

At the end of the employment, Mac was required to fill out an evaluation form for the temporary employee and send a copy to the employee's school---in this case to Dr. Knight. Mac and I didn't have time to review his evaluation before I left so I didn't know what type of evaluation he had given me. After returning to school, Dr. Knight came bouncing into my office one day smiling broadly. He gave me a copy of the evaluation and congratulated me on the evaluation. Mac had written something like "employee showed good initiative. When weather conditions compromised the collection of information according to the study design and thus threatened the validity of the study, the employee showed good initiative by expanding the scope of the data collection and thus increasing the quantity of the data." Little did Mac know that it was not a matter of initiative but of not fully understanding his directions.

The following year, I returned to RM and worked for Mel McKnight on his western spruce budworm studies. During that summer, I was able to get a commitment from Dr. Wygant, project leader for the insect research, to finance a study for a graduate degree. RM Station supplied me with a list of potential studies deemed important to project research and I was able to select one of my choosing. The study dealt with the insect predators of the MPB and the study began the study in the summer of 1965. Because a suitable site was not found in the vicinity of Fort Collins, Mac and I journeyed to the Black Hills where a MPB epidemic was underway. A suitable study site was found SW of Lead, SD just east of Terry peak. From 1965 to 1967, trees were sampled and observations were made on insect predator densities and behavior.

The study yielded good information on the within-tree densities of the clerid, *Enoclerus sphegeus* LeConte, and the dolichopid fly, *Medetera aldrichii* Wheeler, the behavior of the adults on the bark of MPB-infested trees, and the discovery of adult asilid flies, *Laphria gilva* L., capturing emerging MPB in flight.

Of all the places I have worked, the Black Hills tops my list. MPB dynamics, active stand management, historical sites, cultural amenities, scenic vistas, and friendly, interesting people make the Hills a great place to work. If you ever have the opportunity to work there, don't pass it up.

Simultaneously with my work, Mac was participating in a cooperative study in the Hills with the remote sensing project from the PSW Station. The study, headed by Bob Heller and Phil Weber, tried to determine if aerial previsual detection of MPB-infested trees was possible. After the 1965 field season, I spent my first winter in Fort Collins. During the Christmas season, I anonymously sent Mac a subscription to Playboy magazine. After receiving the first copy, Mac was storming---whether really or pretentiously I didn't know. Anyway, Mac suspected the boys from Berkeley as the culprits and vowed to get even. I went to the Hills in early May in 1966 and Mac came north sometime later to join the PSW crew for their first data collection session. On their first day out, Mac announced that he had not brought a lunch, was heading into Lead for lunch, and would bring out lunch for anyone who had also forgotten to pick up a lunch. Dick Myhre, photographer for the

project and later photographer for MAG in Fort Collins, asked Mac to bring him a sandwich. Mac's eyes lit up and his anticipation of getting even was evident as he drove off in a cloud of dust. A short time later he returned but not before he had stopped at a grocery store and picked up a loaf of bread, lettuce, dressing, and sandwich bags. On the way into the plot area, we passed through a barn yard complete with cattle and their byproducts. Mac stopped in the yard and picked up a cow pie, just the right size to fit between 2 slices of bread and some lettuce. With a straight face, he handed the "sandwich" to Myhre and said "here's your sandwich." Fortunately, Dick examined the sandwich before taking a bite but after that, a "Big Mac" had a different connotation in the Hills!

Following the 1967 field season, my work on the MPB in the Black Hills ceased. At that time, the insect project, under the direction of Noel Wygant, worked primarily on the MPB, western spruce budworm, and spruce beetle (SB). Because Mac was working on the MPB and he had seniority, Dr. Wygant was decreasing his involvement with the SB, and no one was working full time on the SB, I was assigned to work on it. Over the course of the next 10 years, I worked on SB in logging residuals and blowdown, solar heat and chemicals for increasing mortality, needle temperatures of infested vs. noninfested trees, development of stands following SB infestation, and refinement and creation of lethal trap trees. The work took me throughout Colorado, into Arizona and New Mexico, and rare trips to Utah, Montana, and Alaska. Simultaneously with the SB work in the mid-1970s, a study of seed and cone insects affecting Engelmann spruce was conducted at the Fraser Experimental Forest.

In the late 1970s, the CANUSA program began. Because our project was scrambling for funds, we submitted studies. CANUSA funded a study on the distribution of egg masses and larvae in the crowns of Douglas-fir and white fir---this work was conducted in northern New Mexico and southern Colorado. Simultaneously, a study of the incidence of WSBW parasitism in sprayed vs. unsprayed areas was conducted in northern New Mexico in cooperation with Region 3. As this work was in progress, a pandora moth epidemic erupted on the Kaibab National Forest in northern Arizona. In cooperation with entomologists in Region 3 and the Kaibab staff, work commenced on prescribed burning to kill pandora moth pupae in the duff and top soil layer. A study was also started on the distribution of egg masses and larvae in the crowns of the ponderosa pine.

In 1981, the insect project in Fort Collins was terminated. Bob Stevens and Steve Mata remained in Fort Collins as part of a multi-functional project; the rest of the staff was offered positions in other locations. I was offered a position in Flagstaff, Arizona and began work there in 1982. The primary work at Flagstaff was to be seed and cone insects in ponderosa pine. While seed and cone insects can cause substantial destruction of ponderosa pine seed and cones, I thought the work secondary in importance compared to bark beetles and the WSBW. Nevertheless, we began a study of the important seed and cone insects and the amount of seed and cone loss they were causing. Fortunately for me, the pandora moth epidemic was continuing on the North Rim. I scheduled my technician to collect most of the information on the seed and cone insects while I spent as much time as possible working on the pandora moth on the North Rim.

During the field seasons of 1982 and 1983, entomologists from Region 3 and I conducted studies on the distribution of egg masses and larvae, life history, emergence and behavior of adults, impact of the defoliation, and the effects of several aerially-applied insecticides on pandora moth larvae.

The pandora moth epidemic was somewhat centered around Jacob Lake, Arizona. Although Jacob Lake is not really a lake but just a pond, not really a town but just a crossroads, it is important because it is the last commercial establishment before one enters the northern part of Grand Canyon National Park and nearly all of the visitors to the North Rim funnel through the Jacob Lake area. The Jacob Lake complex contains cabins, motel rooms, a restaurant, a gift shop, groceries, and fuel. Region 3 entomologists and I usually stayed there during our work and usually returned for lunch at the restaurant. On one occasion, Dayle Bennett, Mike Andrews (Dayle's summer assistant), and I sat down at the lunch counter. Across from us at another part of the counter sat an older couple who, judging by their accent, were from Germany or a country where German was the primary language. Their lunches were served shortly after we sat down. The man

had apparently ordered a bacon, lettuce, and tomato (BLT) sandwich. By chance, he lifted off the top slice of bread and found no bacon present. He voiced his surprise to his wife, not in loud terms but loud enough so that his words were heard at our location. Mike Andrews, being quick-witted, leaned forward and addressed the man across from us--- "Excuse me sir." As the man looked at us, Mike continued "BLT doesn't mean bacon, lettuce, and tomato in this country; it means bread, lettuce, and tomato." Such was life on the North Rim.

In 1984, Bob Stevens retired and I was able to transfer back to Fort Collins to fill his position. At that time, the primary study for the entomology position in the multifunctional project was to determine the relationship between various levels of stand density and mountain pine beetle-caused tree mortality. During the next 6 years, Steve Mata and I established sets of growing stock level (GSL) plots in lodgepole (LP) and ponderosa pine (PP) stands in Colorado, southern Wyoming, and the BlacK Hills of South Dakota. Elaborating on a plot design by Russ Mitchell, we usually installed a partially cut GSL 40, GSL 80, and GSL 120 in conjunction with a control at each of the LP sites and a GSL 60, GSL 80, and GSL 100 in conjunction with a control at each of the PP sites. Occasionally, we added a fifth plot or cut to different densities at some locations. After a number of plots were established, we used the plots at several locations to study: water stress in partial cut vs. uncut stands; bark temperatures and wind conditions in cut and uncut plots in order to elaborate on Bartos and Amman's microclimate concept; and evaporation of verbenone from capsules in cut vs. uncut stands. Simultaneously with this work in the late 1980s, we worked with Ken Lister and Gene Amman to test several densities of verbenone capsules for preventing MPB attacks.

Work on the plots continued after I retired from the Forest Service. At least 10 years has past since each of the various sets of plots were cut so plots were remeasured and the information published. Some of the plots are approaching the 20-year mark since cutting. Hopefully, we can revisit them and produce additional information on partial cutting and MPB-caused mortality.

While there were memorable moments during the MPB work in the late 1980s, the outstanding moment came after I left the FS. In 1995, the WFIWC was held in Rapid City, SD. During the planning of the program, it was decided to have a field trip to visit one set of GSL plots and to offer a hot lunch near the plot location. Once it was decided to have steak and baked potatoes, how to bake the potatoes on site presented a problem. That quiet, seldom vocal, entomologist from Rapid City, Bill Schaupp, suggested contacting the RM Station field lab in Rapid City to see if they had any facilities suitable for the task. They did; a large oven used for drying plant material. We cooked the potatoes in the oven, transferred them to an insulated cooler for transport to the site, and then placed them on the grill for warming just before they were served. A number of attendees were complimentary with regard to the steaks and potatoes. It was only later that afternoon when we were returning some of the equipment that we learned why the potatoes may have had a distinctive taste. Some years prior, the SD State Police had contacted the lab and requested permission to dry the remains of a murder victim. As Paul Harvey says, "Now you know the rest of the story." And please express your thanks to Mr. Schaupp.

Recently, Steve Mata and I analyzed data from the LP GSL plots. While most of the plots have not been subjected to MPB infestations since installation, the stand data was used in several hazard rating methods to evaluate how applicable those methods are with regard to predicting current and future susceptibility of partially cut LP stands. Six slides are presented.

Slide 1. To give a general idea of our partial cutting design, slide 1 depicts the number of trees per acre in the various 1-inch diameter classes when we installed the Brush Creek plots and after the plots were cut. Differences in the numbers per diameter class illustrates how we discriminated against the lower diameter classes---not exclusively but proportionately more.

Slide 2. Mean diameter, age of site index trees, and elevation/latitude from the Brush creek and Colorado State Forest GSL plots were used in the Amman et al hazard rating system to derive a hazard rating for each of the plots at installation, after cutting, and at remeasurement.

Basically, the hazard ratings for unmanaged stands does not change after cutting or in the future.

Slide 3. Percentage of susceptible pine basal area, trees per acre converted to trees per hectare, age of site index trees as substituted for age of the stand, and elevation/latitude from the Brush Creek and Colorado State Forest GSL plots were used in the Shore and Safranyik rating system to determine susceptibility ratings for each of the plots at installation, after cutting, and at remeasurement. Hazard ratings for the partially cut stands decrease after cutting but do not change thereafter.

Slide 4. Stand density indexes for the Brush Creek and Colorado State Forest plots were compared to the low and high susceptibility categories in the Anhold et al. rating method. Most of the uncut stands rate low in susceptibility because either the number of trees per acre was above the upper limit of high susceptibility or the average diameter was <8 inches. After cutting and at remeasurement, most of the higher density partially cut stands rated high in susceptibility because the number of trees per acre was in the zone of high susceptibility.

Slide 5. Basal area values after cutting and at remeasurement for each partial cut GSL at the Brush Creek location were plotted and straight lines were drawn through the 2 points for each plot. Each line was projected until it intercepted the BA 120 and BA 150 levels or until years since cutting (x-axis) equaled 100.

Slide 6. Basal area values after cutting and at remeasurement for each partial cut GSL at the Colorado State Forest location were plotted and straight lines were drawn through the 2 points for each plot. Each line was projected until it intercepted the BA 120 and BA 150 levels or until year since cutting (x-axis) equaled 100.

Landing the job in Fort Collins provided multiple benefits. Besides being able to travel and work on the forests of the central and southern Rockies, the Fort Collins location enhanced my pursuit of knowledge regarding early western history, particularly the area encompassed by the Platte and Missouri rivers, and the Rockies. I have visited points along the Oregon Trail, forts, museums, battlefields, and cemeteries. I came to know the paintings of the early artists, Russell and Remington, and the photos of Illingworth and Huffman. I especially like the paintings of Russell who painted wildlife, historic events, and scenes from the every day life of the cowboy as well as his own Christmas cards. I was fortunate to know someone who owned an original, had it duplicated into a Christmas card, and sent a copy to me. In addition to the painting, Russell also wrote his own Christmas greetings on the scene. His verse may not be familiar to many of you because it is from another era. An era in which travel was primarily by horseback, motels were nonexistent, and one camped wherever you were when the day ended, hopefully beside a source of water. The scene is of two cowboys who meet on the prairie. One pulls a bottle from his saddlebags and toasts his friend with the following words. The words, which echo my sentiments to each of you, go something like this:

Here's hoping your trail is a long one,
plain and easy to ride,
May your dry camps be few,
and health ride with you,
To the Pass on the Big Divide.

Thank you very much! Amigos.

10:30-12:00 Panel / Ponencia Magistral **Salón Stelaris**

Fostering Partnerships – success stories of cooperation
Fomentando Nuestra Colaboración – ejemplos exitosos

Moderador/Moderador – Jorge E. Macías Sámano, Colegio de la Frontera Sur, ECOSUR, Coordinación General del Postgrado, Carretera Antiguo Aeropuerto Km 2.5, 30700 Tapachula, Chiapas, México (jmacias@tap-ecosur.edu.mx; jmacias33@hotmail.com)

A_E **Fostering Transcontinental Partnerships: From a Scolytid Perspective**
A_S **Apoyando Asociaciones Transcontinentales: Desde una Perspectiva de Escolítidos**

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Fostering Transcontinental Partnerships: From a Scolytid Perspective

In April of 1997, three entomologists and one bilingual statistician converged in California to conduct a study of *Conophthorus* chemical ecology. This triangulation was remarkable insofar as one entomologist traveled to Mexico at his own expense, and the other two were dealing with a close-out of cone and seed insect research. Clearly this was research on a shoestring. Over the years, however, this research effort has snowballed into a widespread international collaboration. Its success is tribute to the hard work of a long string of people, including researchers and graduate students from several academic and research institutions (INIFAP, Universidad Michoacana de San Nicolas de Hidalgo, Universidad Autonoma Chapingo, El Colegio de la Frontera Sur, Colegio de Postgraduados en Ciencias Agricolas, and Universidad Autonoma de Aguascalientes). Sylvia Mori, a consulting statistician at PSW Research Station who speaks fluent Spanish, was crucial to the development of international relationships. Grant administrators and other personnel who took on the challenge of multilingual research all contributed to the success of this work. Foresters in the indigenous community of Nuevo San Juan Parangaricutiro were instrumental in developing the first field studies. Bilingual scientists within the USDA Forest Service were particularly important in fostering international connections and furthering work of mutual interest. Our early work with cone beetles led to approaches (notably microencapsulated semiochemicals) appropriate for protection of trees from attack by bark beetles, arguably the most damaging forest pests continent-wide. Target tree species included *Pinus leiophylla, Pinus pseudostrobus, Pinus oocarpa* and *Pinus teocote*, among many others (see Table 1). We also employed pheromones for early detection of pests of such rare and endangered pines as *Pinus pinceana, Pinus herrerai*, and *Pinus rzedowskii*. Now, eight years later, we are embarked upon a wide-ranging set of studies investigating semiochemical control and geographical variation in beetle chemical ecology, both for detection of pests and protection of trees.

Table 1. List of tree hosts, study locations, and projects (early detection or protective treatments) involving North American scolytid pheromones.

Host Species	Location (state)	Project
P. albicaulis	Idaho, Montana	Detection, protection
P. ayacahuite	Hidalgo	Detection
P. cembroides	Guanajuato, Hidalgo	Detection, protection
P. contorta	Idaho, Montana	Detection
P. hartwegii	Mexico, Puebla	Detection, protection
P. herrerai	Michoacan	Detection
P. lambertiana	California	Detection, protection
P. leiophylla	Aguascalientes, Michoacan, Mexico	Detection, protection
P. michoacana	Michoacan	Detection, protection
P. montezumae	Michoacan	Detection
P. oocarpa	Chiapas	Detection

P. pinceana	Hidalgo	Detection
P. ponderosa	California, Idaho, Montana, Utah	Detection, protection
P. pringlei	Michoacan	Detection
P. pseudostrobus	Michoacan, Mexico, Guanajuato	Detection, protection
P. resinosa	Pennsylvania, Wisconsin	Detection, protection
P. rzedowskii	Michoacan	Detection
P. teocote	Michoacan	Detection, protection

Apoyando Asociaciones Transcontinentales: Desde una Perspectiva de Escolítidos

En Abril de 1997, tres entomólogos y un estadístico bilingüe se reunieron en California para realizar estudios de ecología química de *Conophthorus*. Esta unión tripartita fue en verdad fuera de serie, puesto que un entomólogo viajó, por cuenta propia, desde México y los otros dos recientemente habían perdido todo su financiamiento para investigaciones y estaban en la transición de cambiar trabajos en la Costa Este. Claramente esto era investigación "con las uñas". Su éxito es un tributo a la amalgama de mucha gente, entre ellos investigadores y estudiantes del Instituto Nacional de Investigaciones Forestales y Agropecuarias, Universidad Michoacana de San Nicolás de Hidalgo, Universidad Autónoma Chapingo, El Colegio de la Frontera Sur, Colegio de Postgraduados, y la Universidad Autónoma de Aguascalientes. También varios grupos del USDA Forest Service contribuyeron, ellos fueron: Pacific Southwest Research Station, Forest Health Technology Enterprise Team, International Programs, y Pacific Northwest Region. El trabajo de Sylvia Mori, estadístico de la Estación PSW, fue crucial en el desarrollo de esta asociación internacional. Los administradores financieros y otro personal que tomaron como un reto la investigación multilingüe, también contribuyeron al éxito de este trabajo. Científicos bilingües de México y de dentro del USDA Forest Service fueron importantes para mantener las conexiones e impulsar el trabajo de interés mutuo. Nuestro trabajo inicial con *Conophthorus* nos llevó a tendencias (notablemente a la encapsulación de semioquímicos) apropiadas para descortezadores, los que son discutiblemente las plagas forestales más dañinas. Ahora, ocho años más tarde, nos embarcamos en estudios muy amplios de control con semioquímicos y de variaciones geográficas en la ecología química del escarabajo. Si bien no fuimos de "pobres a ricos", nosotros al menos hemos ido del germoplasma al xilema, desde una perspectiva de escolítidos.

B_E EMEND: A New Partnership Paradigm
B_S EMEND: Un Nuevo Paradigma en Asociaciones

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EMEND: A New Partnership Paradigm

Ecosystem Management by Emulating Natural Disturbance (EMEND) is a large multi-disciplinary research project seeking to determine forest harvest and regeneration practices that best maintain natural plant and animal communities when compared to communities resulting from natural disturbances. Objectives of EMEND include determining the effects of fire and forest harvest on various plant, animal, bird and insect communities as well as determining the effects these disturbances on ecosystem function. They also include comparing costs and productivity levels of different harvesting and silvicultural regeneration treatments, both in the narrow economic sense and in the broader sense of sustainable forest management. This experiment is being emulated internationally and would not be feasible without an important network of partners. We describe the principles and implementation of partnership development that made EMEND an award winning undertaking.

EMEND: Un Nuevo Paradigma en Asociaciones

Manejo de Ecosistemas por medio de Emulación de Disturbios Naturales (EMEND por sus siglas en inglés) es un gran proyecto multidisciplinario que busca determinar el aprovechamiento forestal y las prácticas de regeneración que mejor mantenga las comunidades naturales de animales y plantas cuando son comparadas con aquellas resultantes de disturbios naturales. Los objetivos de EMEND incluyen el determinar los efectos del fuego y el aprovechamiento forestal en varias

comunidades de plantas, animales, aves e insectos, así como determinar los efectos de estos disturbios en el funcionamiento del ecosistema. También incluye la comparación de costos y niveles de productividad de diferentes tratamientos de aprovechamientos y regeneraciones silviculturales, ambos en el sentido estrecho de la economía y en el sentido amplio del manejo forestal sustentable. Este experimento se está emulando internacionalmente y no sería posible sin una importante red de asociados. Describimos los principios y la implementación para el desarrollo de la asociación que hace de EMEND una tarea triunfadora.

C_E **Pheromone development for forest pest management**
C_S **Desarrollo de feromonas para el manejo de plagas forestales**

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Pheromone development for forest pest management

The Forestry Science Division had achieved several projects regarding pheromones of pine bark beetles and cone beetles, all of them in cooperation with the USDA-FS.

Predators such as *Enoclerus archanodes*, *E. erro* y *E. ablusus* and several parasitoids (unidentified yet by USA specialist) were caught in experiments monitoring *Dendroctonus* bark beetles. Experiments assessing attraction of cone beetles, *Conophthorus* spp, to several semiochemicals in two locations showed that *C. ponderosae* was significantly attracted to pytiol baited traps, while *C. edulis* was attracted, although not significantly, towards pytiol + 4-allynalisol and pytiol + verbenone. A third line of research consisted on applying several semiochemicals to protect *Pinus cembroides* cones from *C. edulis* attack. A good protection was obtained with verbenone and 4-allynalisol. This year a collaborative research on the chemical ecology of *Dendroctonus valens* in Atlautla, State of Mexico. This research aims to evaluate the responses of that bark beetle to several host monoterpenes.

Desarrollo de feromonas para el manejo de plagas forestales

La División de Ciencias Forestales durante varios años ha realizado convenios de investigación con el Servicio Forestal de los Estados Unidos. Los trabajos han versado sobre varios tópicos del uso de feromonas. El monitoreo de enemigos naturales de los descortezadores del género *Dendroctonus* en el cual se obtuvo como resultado la colecta e identificación de varias especies de cleridos como son: *Enoclerus archanodes*, *E. erro* y *E. ablusus.* Además de varios parásitos que se mandaron a identificar con especialista en Estados Unidos. La evaluación de la atracción de *Conophthorus* a varios semioquímicos en dos localidades, los resultados demostraron que C. *ponderosae,* fue significativamente atraído a trampas cebadas con pitiol en varios experimentos, mientras que C. *edulis* fue atraído por las feromonas pitiol + 1-alilanisol y pitiol + verbenona pero en ningún caso las colectas fueron estadísticamente significativas. Una tercer investigación consistió en la aplicación de varios semioquímicos para la protección de conos de *Pinus cembroides* del ataque de *Conophthorus edulis*, encontrándose que las feromonas verbenona y 4-allynalisol presentan un buen grado de protección a la producción de conos. Finalmente en este año se esta realizando una investigación conjunta sobre la ecología química de *Dendroctonus valens* en Atlautla Edo de Méx. con el objetivo de evaluar la respuesta del descortezador a varios monoterpenos del hospedante.

1:00-2:30 **Student Presentations / Presentaciones Estudiantiles** **Salones Margarita, Magnolia y Jazmin**

Salón Margarita

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1_E Using ant (Hymenoptera: Formicidae) functional groups as indicators of forest health

1_S El uso de grupos funcionales de hormigas (Hymenoptera: Formicidae) como indicadores de salud forestal

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2_E Multiple disturbances and ground beetles: Are the effects of wildfire and forest harvesting cummulative?

2_S Los efectos combinados de fuego intenso y la poda en los escarabajos del suelo del bosque boreal

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Multiple disturbances and ground beetles: Are the effects of wildfire and forest harvesting cummulative?

Natural disturbances, such as wildfire, continue to play a dominant role in shaping the boreal forest landscape. However, increasing demand for both timber and non-timber resources is shifting the dominance of disturbance regimes from one that was natural to one that is more anthropogenic and the effect of this shift on boreal ecosystems remains unclear. Therefore, to achieve goals for biodiversity conservation and sustainable forest management, we need to know more about the individual and combined effects of natural and anthropogenic disturbances. In this study, we examined the response of ground beetles (Coleoptera: Carabidae) to combinations of wildfire and forest harvesting to test the hypothesis that the effects of these two disturbances are cumulative. Specifically, we conducted a replicated, stand-level experiment within the boundaries of a large-scale wildfire (~120,000 ha) that occurred during the spring of 2001 near Chisholm AB, Canada (~200 km northwest of Edmonton). This experiment compared five different stand treatments: control (undisturbed by fire or harvesting in >100 yrs), burned (Chisholm fire), harvested (clear-cut logged), salvaged (burned by the Chisholm fire and then harvested), and burned after harvest (harvested and then burned by the Chisholm fire). Ground beetles were sampled by standardized pitfall trapping during the summers of 2002 and 2003 and resulted in a collection of more than 20,000 individuals from 51 species. Preliminary analyses suggest that both fire and harvesting significantly altered the ground beetle assemblages and that the combined effects of these two disturbances were greater than either disturbance alone. In addition, our results also show that many of these differences are linked to changes in the amount of coarse and fine woody debris, suggesting that these two abiotic parameters could potentially be managed to mitigate the effects of disturbance on ground beetle assemblages.

Los efectos combinados de fuego intenso y la poda en los escarabajos del suelo del bosque boreal

Los disturbios naturales, tales como el fuego intenso, continúan desempeñando un papel importante en la formación del paisaje del bosque boreal. Sin embargo, la demanda va en aumento para los recursos maderables y los no maderables lo que está cambiando la dominación de los regímenes del disturbio a partir de uno que es natural y otro que es antropogénico, el efecto de este cambio en el resto de los ecosistemas boreales aún es confuso. Por lo tanto, para alcanzar las metas para la conservación de la biodiversidad y el manejo sustentable del bosque, necesitamos saber más sobre el particular de los efectos combinados de disturbios naturales y antropogénicos. En este estudio, examinamos la respuesta de los escarabajos (Coleóptera: Carabidae) a las combinaciones de fuego intenso y bajo control en el bosque que esta bajo aprovechamiento o cosecha, para probar la hipótesis de que los efectos de estos dos disturbios

son acumulativos. Específicamente, realizamos una replica, dentro de los límites de una gran área de fuego intenso (~120,000 ha.) que ocurrió durante la primavera de 2001 alrededor Chisholm AB, Canada (~200 km al noroeste de Edmonton). En este experimento se compararon 5 diferentes tratamientos con su testigo: Controlado (sin perturbación al fuego o bosque cosechado en >100 años), Quemado (fuego en Chisholm), Cosechado (neto registrado), Salvado (quemado por el fuego en Chisholm y después cosechado), y Quemado después de que se cosecha (cosechado y después quemado por el fuego de Chisholm). Los escarabajos de tierra fueron muestreados por la captura estandarizada de la trampa durante los veranos de 2002 a 2003 y dio lugar a una colección de más de 20.000 individuos a partir de 51 especies. Los análisis preliminares sugieren que el fuego y la cosecha perceptiblemente alteraran las capas de tierra del escarabajo y que los efectos combinados de estos dos disturbios eran mayores que cualquier otro disturbio. Además, nuestros resultados también demuestran que muchas de estas diferencias están ligadas a los cambios en la cantidad del desperdicio grueso y fino del arbolado, sugiriendo que estos dos parámetros abióticos se podrían manejar potencialmente para atenuar los efectos del disturbio en las capas de tierra del escarabajo.

3_E Is partial cut harvesting a viable alternative for the conservation of saproxylic beetles to predisturbance levels?

3_S ¿Es la cosecha de corta parcial una alternativa viable para la conservación de escarabajos 'saproxilicos' a niveles de pre- disturbio?

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Is partial cut harvesting a viable alternative for the conservation of saproxylic beetles to predisturbance levels

In recent years, partial cut harvesting, removing a portion of trees, has been studied to determine whether this is a viable alternative to traditional harvesting to conserve ecosystem processes and biodiversity. One of the goals of the Ecosystem Management by Emulating Natural Disturbance (EMEND) research project in northern Alberta, Canada is to explore this idea and compare it to natural disturbances such as wildfire. This project focuses on saproxylic beetles, a group of insects that are associated with dead wood. These beetles are key components in the decomposition of dead wood and comprise a large component of the boreal forest biodiversity. Furthermore, studies in Europe have identified this group to be negatively affected by traditional intensive forestry. Partial cut harvesting did not have any benefits to conserve this group of insects to pre-disturbance levels even at high retention levels. Two major trends are observed after harvesting: 1) disturbance adapted species augment the pre-disturbance beetle community (eg. fungivores) or 2) disturbance adapted species displace the pre-disturbance communities (eg. bark beetles & predators). Further study is required to determine what benefits partial cut harvesting has on the ability of this community to return to pre-disturbance levels, and what effects this change in saproxylic beetle community might have on decomposition and other key forest ecosystem processes.

¿Es la cosecha de corta parcial una alternativa viable para la conservación de escarabajos 'saproxilicos' a niveles de pre- disturbio?

En años recientes, se ha estudiado la cosecha de corte parcial; que remueve sólo un parte de árboles, para determinar si ésta es una alternativa viable a la cosecha tradicional para conservar los procesos del ecosistema y la biodiversidad. Una de las metas del proyecto Manejo del Ecosistema por Emulación del Disturbio Natural (EMEND) que se lleva a cabo en el norte de Alberta, Canada, es explorar esta idea y compararla con los disturbios naturales tales como el fuego espontáneo. Este trabajo se enfoca en los escarabajos "saproxilicos", un grupo de insectos asociados a la madera muerta, elementos clave para su descomposición que constituyen un gran componente de la biodiversidad del bosque boreal. Además, estudios en Europa han identificado a

este grupo de insectos verse afectado negativamente por la silvicultura tradicional intensiva. La cosecha de corte parcial no tuvo beneficio para conservar este grupo de insectos a niveles de pre-disturbio, aún con alta retención. Se observan dos tendencias principales después de la cosecha; 1) las especies adaptadas al disturbio se incorporan a la comunidad pre-disturbio (p. ej. fungívoros) o 2) las especies adaptadas al disturbio desplazan a las comunidades pre-disturbio (p. ej. escarabajos de la corteza y depredadores). Se requiere de estudios adicionales para determinar que beneficios tiene la cosecha de corte parcial en la habilidad de esta comunidad para regresar a niveles de pre-disturbio, y que efectos podría tener este cambio de la comunidad de escarabajos "saproxilicos" en la descomposición y otros procesos clave del ecosistema forestal.

Salón Magnolia

Moderator/Moderador: Armando Equihua Martínez, Instituto de Fitosanidad, Colegio de Postgraduados, Carr. Mex-Tex., Montecillo, Mex. CP 56230, Mexico

1E Pests and diseases in teak (*Tectona grandis* L.f.) in Central America

1S Plagas y parásitos de teka (*Tectona grandis* L.f.) en America Central

Marcela Arguedas, Instituto Tecnológico de Costa Rica, Centro de Investigación en Integración Bosque Industria, Costa Rica

Pests and diseases in teak (*Tectona grandis* L.f.) in Central America

Teak (*Tectona grandis* L.f.) is one of the main species used for reforestation in tropical regions. Currently there are 40000 ha reforested with this species in Costa Rica. During the last eigtht years, commercial plantations of *T. grandis* in the Huetar Norte, Huetar Atlántica and Chorotega regions of Costa Rica have been inspected in order to diagnose for herbivores and phytopathogens. Twenty species of insects (48%), 18 species of pathogens, two species of vertebrates and one species of mistletoe (Lorathaceae Family) were identified. Problems with major impact on buds are produced by *Phomopsis* sp.; on foliage by *Pseudoepicocus* sp. (spots) and the defoliating insect *Hyblaea puera* (Hyblaeidae, Lepidoptera) and *Rhapdopterus* sp. (Crhysomelidae, Coleoptera). Damages to tree trunks produced by the bacterium *Agrobacterium tumefaciens* and various cankers of fungoid origin (*Nectria nauriticola*, *Fusarium* sp. and *Botryodiplodia* sp.), as well as the borers *Plagiohammus spenipennis* and *Neoclytus cacicus* (Cerambycidae, Coleoptera) are described.

Plagas y parásitos de teka (*Tectona grandis* L.f.) en América Central

La teca (*Tectona grandis* L.f.) es una de las especies mayormente usadas en reforestación en las regiones tropicales. Actualmente existen 40000 ha reforestadas con esta especie en Costa Rica. Durante los últimos ocho años, plantaciones comerciales de *T. grandis* en las regiones Huetar Norte, Huetar Atlántica y Chorotega de Costa Rica han sido inspeccionadas para la determinación de herbívoros y fitopatógenos asociados a la especie. 20 especies de insectos (48%), 18 especies de patógenos, dos especies de vertebrados y un muérdago (Familia Lorathaceae) fueron identificados. Los problemas de mayor impacto en brotes son producidos por *Phomopsis* sp.; en follaje por *Pseudoepicocus* sp. (manchas) y el esqueletizador *Hyblaea puera* (Hyblaeidae, Lepidóptera) y *Rhapdopterus* sp. (Crhysomelidae, Coleoptera). En el fuste, los daños producidos por la bacteria *Agrobacterium tumefaciens* y varios cancros de origen fúngico (*Nectria nauriticola*, *Fusarium* sp. y *Botryodiplodia* sp.), así como los barrenadores *Plagiohammus spenipennis* y *Neoclytus cacicus* (Cerambycidae, Coleoptera) son descritos.

2E Performance and nutritional ecology of *Acronyctodes mexicanaria* (Lepidoptera: Geometridae) on *Buddleia cordata* (Loganiaceae) of separate gender

2S Desempeño y ecología alimenticia de *Acronyctodes mexicanaria* (Lepidoptera: Geometridae) sobre *Buddleia cordata* (Loganiaceae) de distinto sexo

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Performance and nutritional ecology of *Acronyctodes mexicanaria* (Lepidoptera: Geometridae) on *Buddleia cordata* (Loganiaceae) of separate gender

Buddleia cordata (tepozan) is an arboreal dioic species very abundant in the conserved and disturbed areas in Ciudad Universitaria (Distrito Federal). *Acronyctodes mexicanaria* caterpillars feed exclusively on tepozán at this location. It is well known that many herbivores feed preferentially on male plants in dioic species. Although it is not clear whether there is a relation between the sex of the plants and the performance and nutritional ecology of herbivores. There are few studies which evaluate this issue and this study explores the system *Buddleia cordata-Acronyctodes mexicanaria*. For caterpillars collected from trees of different gender, and for caterpillars fed exclusively with plants of one gender we evaluated: 1) feeding preference, 2) performance (growth, survival, time of development, and density), and 3) nutritional ecology (relative consumption rate, efficiency of conversion of ingested food (ECI), efficiency of conversion of digested food (ECD), and approximate digestibility). We found that A) caterpillars prefer to feed on leaves from female plants B) caterpillars from the latest instar belonging to female trees had a faster development, C) ECD and ECI were higher in caterpillars that fed on female trees leaves. These results suggest that contrary to other common findings, caterpillars of *A. mexicanaria* appear to prefer feeding on female trees, which may allows them to have better nutritional efficiencies and a faster development. Although it seems that survival, growth, and density of caterpillars are independent of the gender of the tepozan.

Desempeño y ecología alimenticia de *Acronyctodes mexicanaria* (Lepidoptera: Geometridae) sobre *Buddleia cordata* (Loganiaceae) de distinto sexo

Buddleia cordata (tepozán) es una especie arbórea dioica muy abundante en las áreas conservadas y perturbadas de Ciudad Universitaria (D.F.). Las orugas de *Acronyctodes mexicanaria* se alimentan únicamente del tepozán en esta localidad. Se sabe que muchos herbívoros prefieren el consumo de plantas masculinas sobre el de plantas femeninas en especies dioicas. Sin embargo no es claro si existe una relación entre el sexo de las plantas sobre el desempeño y la ecología alimenticia de los herbívoros. Existen muy pocos estudios al respecto y este trabajo explora el sistema biológico *Buddleia cordata-Acronyctodes mexicanaria* . Para orugas procedentes de árboles de distinto sexo y orugas alimentadas con plantas de un solo sexo se evaluaron: 1) preferencias alimenticias, 2) desempeño (crecimiento, sobrevivencia, tiempo de desarrollo y densidad) y 3) ecología alimenticia (tasa relativa de consumo, eficiencia de conversión del alimento ingerido (ECI), eficiencia de conversión del alimento digerido (ECD), y digestibilidad aproximada). Se encontró que A) las orugas prefieren alimentarse de follaje de árboles femeninos, B) las orugas de último estadio procedentes de árboles femeninos presentaron un menor tiempo de desarrollo y C) la ECD y ECI fueron mayores en orugas alimentadas con hojas de árboles femeninos. Estos resultados sugieren que, contrariamente a lo que se ha encontrado, *A. mexicanaria* parece preferir alimentarse de árboles femeninos y esto parece permitirle tener mejores eficiencias alimenticias y menor tiempo de desarrollo. Sin embargo, la sobrevivencia, el crecimiento, y la densidad de orugas parecen ser independientes del sexo del tepozán.

3_E Biological control of red gum lerp psyllid *Glycaspis brimblecombei* using *Anoplolepis longipes* as control agent in Guadalajara, Jalisco, Mexico

3_S Control biológico clásico de psilido del eucalipto *Glycaspis brimblecombei* por medio del depredador *Anoplolepis longipes* en Guadalajara, Jalisco, México

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Biological control of red gum lerp psyllid *Glycaspis brimblecombei* using *Anoplolepis longipes* as control agent in Guadalajara, Jalisco, Mexico

The use of enemies, predators in particular, requires field observations to evaluate the diversity of associated species to the pest. The species, that show the best potentiality for use, need to be studied. In this case, the species were *Harmonia axyridis*, *Olla v-nigrum*, *Geocoris punctipes* and *Chrysoperla carnea*. When this phase was concluded, laboratory studies of selected species were necessary with the purpose to know the life cycle, their food preferences and if the predators have the capacity of completing their cycle feeding only with the pest. Field liberations were done to evaluate their behavior in field conditions, in this phase it was necessary to look at the behavior of the predator and the pest, and their relationships. *C. carnea* show one percent to control 23.4-25.6 % with respect to places where did not liberate. It is necessary to study the behavior of the other local predators, which also show to have a relevant paper in the regulation of the psyllid populations in place and time. One of best predators was *Anoplolepis longipes*. The climate has a very important impact with the psyllid population fluctuations, when the incremente of the temperate occur the psylid population increase as well, during the ranily season the population of *G. brimblecombei* decreases.

Control biológico clásico del Psílido del eucalipto *Glycaspis brimblecombei* por medio del depredador *Anoplolepis longipes* en Guadalajara, Jalisco, México

El uso de enemigos naturales, particularmente de depredadores requiere de observaciones de campo que permitan evaluar la diversidad de especies asociadas a una plaga y de éstas estudiar aquellas que muestran mayor potencial de uso, que en este caso fueron *Harmonia oxyridis*, *Olla v-nigrum*, *Geocoris punctipes* y *Chrysoperla carnea*. Una vez concluida esta etapa es necesario realizar estudios de laboratorio de las especies deseadas con la finalidad de conocer el ciclo biológico de la especies, sus preferencias alimenticias y si nuestros depredadores tienen la capacidad de completar su ciclo alimentándose de nuestra especie problema. Finalmente, se requiere de realizar liberaciones de campo para evaluar su comportamiento en condiciones de campo, en este último caso es necesario dar seguimiento al comportamiento de nuestros depredadores y de nuestra plaga a fin de poder valorar la relación entre entomófagos y presas. *C. carnea* presento de 23.4 a 25.6% de control respecto a donde no se liberó. También es recomendable conocer el comportamiento de otros depredadores locales, que mostraron tener un papel muy relevante regulando las poblaciones del psílido en espacio y tiempo. Y uno de esos depredadores, Anoplolepis longipes fue muy prometedor. Además, el clima juega un papel importante regulando las fluctuaciones poblacionales del psílido, ya que el incremento de la temperatura incremente la población, y la aparición de las lluvias decrementa la población de *G. brimblecombei*.

Salón Jazmín

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1_E The effect of the two isomers of verbenone on the control of pine bark beetles (*Dendroctonus* spp.)

1_S Efecto de dos isómeros de la verbenona en el control del insecto descortezador del pino (*Dendroctonus* spp.)

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The effect of the two isomers of verbenone on the control of pine bark beetles (*Dendroctonus* spp)

The species *Malacosoma incurvum* (Lepidoptera: Lasiocampidae) causes serious phytosanitary problems to the trees in Xochimilco, Distrito Federal, caused serious defoliation in ahuejote (*Salix bomplandiana*) which generates alterations in the agricultural, ecological, social, and tourist areas of Xochimilco. The behavior and biology of *M. incurvum* was evaluated in the field. Most egg masses were found in young branches (smooth stems) with an average of 300 egg per mass; the larval development started in the middle of January, 2003, in which a displacement of first instar larvae was observed from 0.60 to 1.20 meters of distance from egg masses, until it finds the apex of growth; the feeding starts in tender buds at the same time the construction of larval silk tent, enlarged its size gradually according to the instars larvae (five instars), their size changes from 5 cm to 45 cm of length, the tent construction was completed in 48 days; many larvae became silken cocoon inside the same larval silk tent to be protected from their predators, however some of them did it in stems and walls. The development of this pupal stage was completed in eight days and the adult in three to five days, then courtship and oviposition took place. Finally, it was observed that the egg remains in the field for about 306 days until the larvae emerge the following year.

Efecto de dos isómeros de la verbenona en el control del insecto descortezador del pino (*Dendroctonus* spp)

La especie *Malacosoma incurvum* (Lepidoptera: Lasiocampidae) ocasiona serios problemas fitosanitarios al arbolado de la zona Chinampera de Xochimilco en el Distrito Federal, causando defoliaciones en ahuejote (*Salix bomplandiana)*, lo cual genera alteraciones en las áreas agrícolas, ecológicas, sociales y turísticas de la región. Se evaluó el comportamiento y biología de *M. incurvum* en el campo. La mayor cantidad de masas de huevos se encontró en ramas jóvenes (tallos lisos) con un promedio de 300 huevos por masa; el desarrollo larvario inició a mediados del mes enero del 2003, en el que se observó un desplazamiento de larvas de primer instar de 0.60 a 1.20 metros de distancia a partir de la masa de huevos, hasta encontrar los ápices de crecimiento; iniciando su alimentación en brotes tiernos y la construcción de una bolsa de seda, misma que aumentó su tamaño paulatinamente de acuerdo a los instares larvarios (cinco instares), iniciando su tamaño desde 5 cm. hasta 45 cm. de longitud, desarrollo que duró 48 días; la mayoría de las larvas puparon dentro de las mismas bolsas de seda para protegerse de sus depredadores, algunas, lo hicieron en troncos y paredes. La duración del estado pupal fue de ocho días y del estado adulto fue de tres a cinco días, durante el cual se realizó el cortejo y la oviposición. Finalmente, se observó que el estado de huevo dura en el campo 306 días hasta la emergencia de las larvas el año siguiente.

2_E Seasonal dynamics of bark beetle flight and tree physiology in a northern Arizona ponderosa pine forest: 2002-2003.

2_S Dinámica estacional del vuelo de insectos descortezadores y la fisiología del árbol en un bosque de pino ponderosa del norte de Arizona.

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Seasonal dynamics of bark beetle flight and tree physiology in a northern Arizona ponderosa pine forest: 2002-2003

Prior to 2002, the ponderosa pine forests around Flagstaff, AZ had not experienced a bark beetle epidemic for at least 100 years. There are many hypotheses to explain this phenomenon. One hypothesis is that peak beetle flight occurs during May/June when tree growth is limited by water stress and (according to the growth differentiation hypothesis) resin production (a primary defense against beetles) is peaking. We measured above/below ground growth and resin flow on ten trees/month west of Flagstaff. To assess bark beetles we used 50 pheromone lures on Lindgren funnel traps. Results for 2002 indicated that bark beetle flight was highest in September for both *Ips* and *Dendroctonus* species. Resin flow peaked in early summer but was not significantly

different from flows in late summer. Little ponderosa pine growth was observed until August. Preliminary results in 2003 indicate a higher number of beetles flying early in the summer (compared to 2002) and, in contrast to 2002, the number of beetles flying declined in August and September. Precipitation was more abundant in 2003 and photosynthesis was higher in 2003 than 2002. Resin flow is not significantly different between the two years and shows similar seasonal trends. This research indicates that our hypothesis cannot fully explain the lack of outbreaks in our area.

Dinámica estacional del vuelo de insectos descortezadores y la fisiología del árbol en un bosque de pino ponderosa del norte de Arizona

Antes de 2002, el bosque de Pino ponderosa alrededor de Flagstaff, Arizona no tenían registro de la plaga de descortezadores en los últimos 100 años. Hay muchas hipótesis para explicar este fenómeno. Una hipótesis es que el vuelo máximo del escarabajo ocurre durante mayo/junio en que el crecimiento del árbol es limitado por la tensión del agua (según la hipótesis de la diferenciación del crecimiento) y la producción de la resina (una defensa primaria contra escarabajos) son determinantes. Medimos el crecimiento y flujo subterráneos de la resina de diez árboles al mes, al Oeste del Flagstaff. Para determinar los escarabajos de corteza utilizamos 50 señuelos de feromona en trampas de embudo tipo Lindgren. Los resultados para 2002 indicaron que el vuelo del descortezador era más alto en Septiembre para los géneros *Ips* y *Dendroctonus*. La resina fluye al máximo a principios del verano, pero no tiene una diferencia significante hasta finales del mismo. Pequeños aumentos de resina en *Pinus ponderosa* se observaron hasta Agosto. Los resultados preliminares en 2003 indican el incremento del número de descortezadores volando a principios del verano (comparado con el 2002) y, en contraste al 2002, el número de escarabajos volando declino en Agosto y Septiembre. La precipitación fue más abundante en 2003 y la fotosíntesis fue más alta en 2003 que en 2002. El flujo de la resina no es significativamente diferente entre los dos años y no demuestra tendencias estacionales similares. Esta investigación indica que nuestra hipótesis no puede explicar completamente la carencia de brotes en nuestra área.

3_E Life cycle in the lab of *Pityophthorus* spp., a bark beetle of *Pinus halepensis*
3_S Ciclo biológico del descortezador *Pityophthorus* spp. en laboratorio en *Pinus halepensis*

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Life cycle in the lab of *Pityophthorus* spp., a bark beetle of *Pinus halepensis*

The life cycle of a species polygamous and phloem feeding bark beetle, *Pityophthorus* sp. collected in Saltillo, Coahuila, is described. From a cohort of 187 eggs, 106 hatched (56.68 percent). The larval instars were reared using the "sandwich" method using consisting in a piece of bark placed between two glass shields inside a hummed chambers. The life cycle was observed during six months in the laboratory under an average temperature of 23 ± 3 ºC. Eggs took an average of 6.74 day to hatch; there are three larval instars taking an average of 6.10, 7.73 and 10.40 days for first, second and third larval instars to develop respectively. Pupal stage lasted 7.77 days who passed to a pre-adult stage during 21.10 days to develop and mature adults lived an average of 27.85 days; in summary, the total life cycle from egg to adult lasted an average of 87.69 days with generations for years. From the 106 eggs only 33 reached the adult stage (22 females and 11 males) and females laid 15.68 eggs in average corresponding to 1.30 eggs per day.

Ciclo biológico del descortezador *Pityophthorus* spp. en laboratorio en *Pinus halepensis*

Se describe el ciclo biológico de una especie de descortezador polígamo y de hábito de floefagia de *Pityophthorus* sp. presente en Saltillo, Coahuila, México. Se observó que de 187 huevecillos eclosionaron 106 (56.68 por ciento), los que fueron ovipositados por 12 hembras. Los estados se desarrollaron utilizando el método de "emparedado", que consiste en colocar los insectos en una placa de corteza del árbol ubicada entre dos cubiertas, una de vidrio y otra de mica colocados en

una cámara húmeda. El ciclo biológico fue desarrollado en laboratorio a una temperatura promedio de 23 ± 3 ºC durante seis meses. El huevecillo requirió de 6.74 días para su eclosión, el primer estadio larval tuvo una duración de 6.10 días, el segundo de 7.73 días y el tercer estadio requirió 10.40 días en promedio, la pupa requiere 7.77 días, el preimago necesitó de 21.10 días para su desarrollo y los adultos vivieron 27.85 días en promedio; por lo anterior se determinó que para alcanzar el estado de adulto *Pityophthorus* sp. requiere acumular 59.84 días por lo que en laboratorio puede alcanzar alrededor de seis generaciones al año y el ciclo biológico desde huevecillo hasta la muerte del adulto es de 87.69 días. La hembra vivió 2.05 días más que el macho. De la cría observada nacieron 22 machos y 11 hembras, el promedio de huevecillos ovipositados por cada hembra fue de 15.68 correspondiendo a 1.30 huevecillos por día.

3:30-5:00 Concurrent Workshop 1 / Sesión Concurrente 1 **Salón Margarita**

Forest Pathology
Patología Forestal

Moderator/Moderador: Dionicio Alvarado-Rosales, Instituto de Fitosanidad, Colegio de Postgraduados, Montecillo, México, México (dionicio@colpos.mx)

A_E Loranthaceous mistletoes on pines in southern Mexico and Central America
A_S Loranthaceas en pinos del sureste de México y América Central

Robert L. Mathiasen, School of Forestry, Northern Arizona University, Flagstaff, AZ USA.

Loranthaceous mistletoes on pines in southern Mexico and Central America

Many species of mistletoes in the Loranthaceae have been reported as parasites of pines (*Pinus* spp., Pinaceae) in southern Mexico and Central America. However, my field work in these regions indicates there are only three species of mistletoes in the Loranthaceae that commonly parasitize pines there: *Psittacanthus angustifolius*, *P. pinicola*, and *Struthanthus deppeanus*. Growth losses and mortality are associated with infection by *P. angustifolius* on pines that have been infected for more than 12 years in central Honduras. *Psittacanthus pinicola* is a common parasite of pines in Belize, Honduras, and Nicaragua, but no work has been completed on the effects it has on its pine hosts. *Struthanthus deppeanus* is uncommon in Honduras and Guatemala but is common in central Chiapas, Mexico where it parasitizes several pine species. Although the most common Loranthaceous mistletoe reported on pines in Central America has historically been *Psittacanthus schiedeanus*, we have not yet observed this mistletoe on pines in Central America or in southern Mexico. A great deal of works remains to be completed on the distribution, biology, and impact of these Loranthaceous mistletoes.

Lorantáceas en pinos del sureste de México y América Central

Muchas especies de muérdagos de la familia Loranthaceae han sido reportadas como parásitos de pinos (*Pinus* spp., Pinaceae) en el sureste de México y América Central. Sin embargo, mi trabajo de campo en estas regiones indica que sólo hay tres especies de muérdagos de Loranthaceae que comúnmente parasitan pinos, estas son: *Psittacanthus angustifolius*, *P. pinicola*, and *Struthanthus deppeanus*. Las pérdidas en crecimiento y mortalidad están asociadas con infecciones por *P. angustifolius* en pinos que han sido infectados por más de 12 años en el centro de Honduras. *Psittacanthus pinicola* es un parásito común de pinos en Belice, Honduras y Nicaragua, pero no se ha trabajado sobre los efectos que ocasiona a sus hospedantes. *Struthanthus deppeanus* no es común en Honduras y Guatemala pero si es común en el centro de Chiapas, México donde se le ha encontrado parasitando varias especies de pino. Aunque históricamente el muérdago de las Loranthaceas más comúnmente reportado en pinos de América Central ha sido *Psittacanthus schiedeanus*, aún no he observado este muérdago sobre pinos de América Central o en el sureste de México. Una gran cantidad de trabajo resta por hacer sobre la distribución, biología e impacto de estas Loranthaceas.

B_E The *Cladocolea* genus in the Mexican City Basin and its management

B$_S$ **El género *Cladocolea* en la Cuenca de México y una propuesta de manejo**

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The *Cladocolea* genus in the Mexican City Basin and its management

The genus *Cladocolea* is a true mistletoe that shows host specificity. Some members are causing health deterioration of at least 15 species of trees and shrubs. There are approximately 23 reports related with the presence of the genus mainly in the south and central part of Mexico where a total of 17 species are reported; among the most important species are *C. grahami* that infects oaks and others like *C. cupulata* and *C. microphylla* infecting conifers. One of the species currently causing severe damage in the Mexican City Basin (MCB) is *C. loniceroides*. This species infects the aerial parts of *Salix bonplandiana* (ahuejote) modifying aesthetics and in some cases contributing to the death of the trees. In order to know incidence and severity of this parasitic plant this study was carried out in one of the most important lacustrian areas of the MCB (Xochimilco). It was determined that 80% of the trees were infected and 46% showed high levels of infection (3 and 4 based on the scale of damage utilized). After light and severe pruning or elimination of the dead rees, severity of damage was reduced in the stands. Light pruning were the most frequent, but severe pruning were also applied in a good percentage of the affected trees. After one year, the "ahuejotes" are producing new and healthy shoots and the appearance of the area is improving. This is a good indicator that pruning is effective for the management of *C. loniceroides* infections.

El género *Cladocolea* en la Cuenca de México y una propuesta de manejo

El género *Cladocolea* es un muérdago verdadero que muestra especificidad por sus hospedantes. Algunos de sus miembros causan el deterioro de aproximadamente 15 especies de árboles y arbustos. Existen al menos 23 reportes de su presencia sobre todo para el centro y sur de México donde se reportan 17 especies; entre las más importantes destacan *C. grahami* que parásita encinos, y otras como *C. cupulata* y *C. microphylla* que infectan coníferas. Actualmente, una especie que está causando graves daños es *C. loniceroides*, la cual es capaz de infectar todos los órganos aéreos de *Salix bonplandiana* (ahuejote) por lo que su estética se ha deteriorado considerablemente, a tal grado que cuando la infección es severa contribuye en gran medida a que el árbol muera. Con el fin de conocer el impacto que tiene este muérdago en cuanto a incidencia y severidad se realizó el presente estudio en una de las zonas lacustres más importantes del D.F. (Xochimilco). Se determinó que el 80% de los árboles estaban infectados y el 46% presentaba altos niveles de infección (3 y 4), de acuerdo con la escala utilizada. Por medio de podas ligeras, severas y derribos, se redujeron los niveles de infección de la planta parásita. Las podas ligeras fueron las dominantes, pero las severas también se aplicaron a un buen porcentaje de árboles. Después de un año, los ahuejotes están respondiendo muy bien a las podas y la estética del lugar ha mejorado. Este es un buen indicador de que las podas han sido efectivas en el manejo de las infecciones de *C. loniceroides.*

C$_E$ **Oak death in Sierra de Lobos, Gto. and their perspectives in Mexico**
C$_S$ **La muerte del encino en Sierra de Lobos, Gto. y sus Perspectivas en México**

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Oak death in Sierra de Lobos, Gto. and their perspectives in Mexico

Since 1999, a massive death of oak trees in the natural area called Sierra de Lobos was observed. The affected trees show dieback due to premature foliage loss. Another characteristic symptom is the presence of bleeding cankers, where a pathogen could be involved. The cankers can be located at the base of the stem, trunk or branches and give to the bark a black color. Several *Phytophthora* species have been associated with oak death in other regions of the world, in Mexico *P. cinnamomi* has been reported in Colima State. The objective of this study was to isolate the fungus; however, after two samplings no fungus was isolated. Among the relevant results are the following: 1) The phytosanitary condition in the study area was poor, 2) red oaks showed to be more susceptible than white oaks, 3) dieback was also more frequent in the red oaks. For future studies we suggest the use of selective media, more sampling (including number and locations where the problem is occurring).

La muerte del encino en Sierra de Lobos, Gto. y sus Perspectivas en México

A partir de 1999 comenzó a observarse una mortalidad masiva de encinos en el área natural protegida de Sierra de Lobos, Edo. de Guanajuato. El arbolado afectado presenta una muerte regresiva debido a la pérdida prematura del follaje más reciente. Otro de los síntomas más característicos y que pudiera ocasionarlo un patógeno es la presencia de cancros que exudan un líquido, el cual da una coloración obscura a la corteza de la base del tallo, tronco y ramas dependiendo de su localización. Varias especies de *Phyotphthora* se han asociado con la muerte del encino en otras regiones del mundo, en México se ha reportado a *P. cinnamomi* en el Estado de Colima. El objetivo de este estudio fue aislar el hongo mencionado, sin embargo, después de dos muestreos no se logró su aislamiento. Entre las razones destacan la técnica de aislamiento, la duración del estudio (tres meses) y la época. Algunos de los resultados relevantes obtenidos son: 1) la condición fitosanitaria en el área de estudio es pobre, 2) los encinos rojos mostraron ser más susceptibles que los blancos a la presencia de cancros, 3) Lo mismo sucedió con el síntoma de muerte regresiva, en los rojos fue más frecuente. Para estudios posteriores se sugiere el uso de medios selectivos, un mayor número de muestreos y en diferentes lugares de México donde el problema ya está presente.

D_E **Update on sudden oak death in North America**

D_S **Actualización sobre la Muerte Repentina del Encino en Norte América**

Patrick J. Shea, SOD Research Program Manager, USDA Forest Service, Pacific Southwest Research Station, Davis, California, USA

Update on sudden oak death in North America

Sudden Oak Death (SOD) is a recently emerging disease of forest and urban trees, shrubs, and horticultural plants. It is presently known to occur in wildland settings in 12 coastal counties in California and one county in southwestern Oregon. It also occurs in horticultural situations in California, Oregon, Washington and British Columbia as well as various areas in Europe. Currently *Phytophthora ramorum*, the causal agent of SOD, is known to naturally infect over 33 host plants ranging from 4 species of oaks to numerous varieties of rhododendrons. Recently announced hosts include California's coastal redwood, Douglas-fir and grand fir. Laboratory studies have demonstrated susceptibility of pin oak and northern red oak, two important tree species of eastern deciduous forests. The disease was first observed in 1995 as large numbers of tanoaks were reported dying in Marin County, California. By July 2000, plant pathologists reported that the trees were killed by a previously undescribed forest pathogen, *P. ramorum*. Trees appeared to die quickly as the disease spread across the region, thus the new disease was named Sudden Oak Death. SOD continues to expand since these initial observations and has killed hundreds of thousands of trees. Using the evaluation process established by the North American Forestry Commission, the Forest Service has rated Sudden Oak Death a high-risk disease. Tree, shrub and horticultural-plant hosts may exhibit a variety of symptoms, but hosts have been broadly categorized as: bark-canker hosts, stem dieback hosts, and foliar hosts. Those hosts exhibiting bark-canker symptoms are also subject to mortality. During the year of 2001 the state of Oregon embarked on an eradication program on a very limited group of infested tanoaks. Data is still being collected so the success of the program is still unsettled. The USDA Forest Service, Pacific

Southwest Research Station has developed a SOD Research Program whose objective is to fund and conduct research on the ecology, biology, epidemiology and behavior of *P. ramorum* as well as determined the environmental, social and economic impact of SOD.

Actualización sobre la Muerte Repentina del Encino en Norte América

La Muerte Repentina del Encino (SOD por sus siglas en inglés) es una enfermedad reciente que se presenta en bosques, árboles urbanos, arbustos y plantas ornamentales. Actualmente se sabe que está presente de manera natural en 12 condados de la Costa de California y uno del suroeste de Oregon. La enfermedad también se presenta en condiciones de vivero en California, Oregon, Washington y Columbia Británica así como en varias áreas en Europa. Actualmente *Phytophthora ramorum*, el agente causal de la muerte repentina del encino, se conoce que infecta de manera natural aproximadamente 33 plantas hospedantes que van de 4 especies de encino a numerosas variedades de rhododendron. Algunos de los hospedantes recientemente incluidos son la sequoia, el Douglas-fir y el grand fir. Los estudios de laboratorio han demostrado la susceptibilidad del roble y el roble rojo del, dos especies arbóreas muy importantes de los bosques deciduos del este. La enfermedad fue observada por primera vez en 1995 cuando una gran cantidad de tanoaks fueron reportados muriendo en el condado Marin de California. En julio del 2000, los fitopatólogos reportaron que los árboles fueron muertos por un patógeno no descrito, *P. ramorum.* Los árboles parecían morir rápidamente conforme la enfermedad se diseminaba a lo largo de la región, es por esto que la enfermedad fue nombrada Muerte Repentina del Encino (SOD). A partir de entonces, SOD continúa avanzando y ha la fecha ha matado cientos de miles de árboles. Empleando el proceso de evaluación establecido por Comisión Forestal de América del Norte, el Servicio Forestal ha colocado a la Muerte Repentina del Encino (SOD) como una enfermedad de alto riesgo. Los árboles, arbustos y plantas ornamentales hospedantes pueden mostrar una variedad de síntomas, pero los hospedantes han sido ampliamente categorizados como: hospedantes con cancros de corteza, hospedantes con muerte regresiva de tronco y hospedantes foliares. Aquellos hospedantes que muestran síntomas de cancros de corteza también están sujetos a morir.

Durante el año 2001 el Estado de Oregon llevó a cabo un programa de erradicación en un número limitado de tanoaks infectados. Los datos todavía no se han colectado para conocer los resultados. El USDA Forest Service y la Pacific Southwest Research Station han desarrollado un programa de investigación sobre SOD cuyo objetivo es proporcionar apoyo económico y conducir investigación sobre ecología, biología, epidemiología y comportamiento de *P. ramorum* así como el de determinar el impacto ambiental, social y económico de SOD.

3:30-5:00 Concurrent Workshop 2 / Sesión Concurrente 2 **Salón Magnolia**

Innovations to Bark Beetle Pest Management with Chemicals
Innovaciones en el Uso de Químicos para el Manejo de Descortezadores

Moderator/Moderador: Jesús Cota, USDA FS Forest Health Protection, 1601 N. Kent St., RPC 7th Floor, Arlington VA 22209, USA (jcota@fs.fed.us)

A_E Preventive spraying for bark beetles in the Southwest United States
A_S Aspersiones de Sevin SL Para La Prevención de Descortezadores en el Sudoeste de Estados Unidos de América

Joel McMillin, USDA Forest Service, Region 3 Forest Health Protection, Flagstaff, AZ, USA

Preventive spraying for bark beetles in the Southwest United States

The southwestern United States has been experiencing a landscape-level bark beetle outbreak in ponderosa pine forests. The combination of extended drought and unprecedented high tree density across the landscape is leading to extraordinary tree losses throughout the Region. As a result of this ongoing outbreak, numerous US Forest Service maintained recreation sites have experienced severe impacts caused by several *Ips* and *Dendroctonus* species. Therefore, it was proposed to implement a preventive spray program for many of these campgrounds and picnic areas to protect high value, good form ponderosa pine in 2003. Due to NEPA constraints, spraying of Sevin SL was limited to sites on two National Forests in Arizona and New Mexico. Results from spraying in nine

recreation sites on the Apache-Sitgreaves National Forest are discussed. Only nine trees out of more than 1,700 trees sprayed were successfully attack by *Ips* species despite heavy beetle pressure in the area. Of these nine attacked trees, 6 were only attacked at the top of the bole suggesting that the spray had not adequately reached the tops of trees. Spray projects in other regions of the western United States are also discussed.

Aspersiones de Sevin SL para la prevención de descortezadores en el sudoeste de Estados Unidos de América

En el sudoeste de Estados Unidos de América ha ocurrido una gran infestación de descortezadores en bosques de pino ponderosa. La combinación de dos factores, una sequía prolongada y una alta densidad de árboles en estos bosques, ha contribuido a una cantidad de mortalidad de árboles extraordinaria en esta región. Debido a esta infestación, numerosos sitios de recreación mantenidos por el Servicio Forestal de Estados Unidos de América han sufrido impactos severos causados por varias especies de escarabajos en los géneros *Ips* y *Dendroctonus*. Por esta razón, se propuso implementar en 2003 un programa de prevención utilizando Sevin SL en sitios de recreación donde se encuentran pinos ponderosos de valor y de buena estructura y forma. La aspersión de Sevin SL se llevó a cabo solamente en dos Bosques Nacionales en los estados de Arizona y Nuevo México debido a restricciones ocasionadas por la ley NEPA. Los resultados de los tratamientos en nueve sitos en el Bosque Apache-Sitgreaves serán presentados. Solamente nueve árboles de más de 1,700 árboles tratados, fueron atacados por *Ips* a pesar de las altas poblaciones de estos escarabajos en el área. De estos nueve árboles atacados, seis fueron atacados solamente en la parte alta del fuste lo que sugiere que las aspersiones no obtuvieron una cobertura adecuada en la copa de estos árboles. Los resultados de otros proyectos llevados a cabo en 2003 en el oeste de Estados Unidos también serán discutidos.

B_E West-wide spray test to protect high value trees from attack by bark beetles
B_S Prueba del Oeste para proteger árboles de alto valor del ataque de los escarabajos descortezadores

Patrick J. Shea, Emeritus Scientist, USDA Forest Service, Pacific Southwest Research Station, Davis, CA, USA

West-wide spray test to protect high value trees from attack by bark beetles

Through a cooperative effort between various western Forest Health Protection entomologists and entomologists with the Pacific Southwest Research Station a west-wide experiment was conducted to test the efficacy of a new synthetic pyrethroid for protection of high value trees from lethal attack by several species of bark beetles. The test was prompted by the concern that carbaryl and permethrin would be lost for tree protection purposes. The new pyrethroid being tested is bifenthrin and is registered for other uses under the name of Biflex. Several rates were tested this past summer on a variety of insect/host combinations. In California Biflex was tested to determine its efficacy in protecting ponderosa pine from attack by western pine beetle; in Montana the host/insect combination was lodge pole pine and mountain pine beetle; in South Dakota the host/insect combination was ponderosa pine and mountain pine beetle; in Utah the test was run on Engleman spruce and spruce beetle; in Nevada the test was run on single-leaf pinyon pine and pinyon ips; in Arizona there was a combination of tests but the primary effort was aimed at ponderosa pine and pine engraver; and finally in Colorado the target was pinyon pine and pinyon ips. One of the unique aspects of this west-wide experiment was that a similar experimental designed was employed to test for efficacy at all the locations. This will allow comparisons to be between hosts and the various species of bark beetles included in the test. The experiment is still in progress and complete results will not be available until next year.

Aspersión en el Oeste para proteger árboles de alto valor del ataque de los escarabajos descortezadores

A través de un esfuerzo cooperativo entre los varios entomólogos de la Protección de la Salud Forestal y del Centro de Investigaciones del Pacífico, se experimentó la eficiencia de un nuevo *Piretroide* sintético para proteger árboles de alto valor, de los ataques letales de varias especies de

escarabajos descortezadores. Este experimento fue generado debido a la preocupación de que los químicos *carbaryl* y *permethrin* podrían perderse para el propósito de proteger a los árboles. El nuevo *piretroide* que se está probando es *bifenthrin* y se registra para otros usos como *Biflex.* Varias medidas fueron probadas el verano pasado con una variedad de combinaciones de insectos/hospederos. En California se probó *Biflex* para determinar su eficiencia para proteger al pino ponderosa del ataque del mountain pine beetle (*Dendroctonus ponderosae*) *;* en Montana la combinación fue *Pinus contorta* y *D. ponderosae*; en South Dakota la combinación fue *Pinus ponderosa* y *D. ponderosae;* en Utah se probó en *Picea engelmanii* y *D. rufipennis*; en Nevada se probó en *Pinus monophylla* y *Ips confusus*; en Arizona hubo una combinación de pruebas pero la mas importante fue la de *Pinus ponderosa* e *Ips pini* ; y finalmente en Colorado el enfoque fue *Pinus edulis* e *Ips confusus*. Uno de los aspectos especiales de este experimento del oeste fue que un diseño experimental similar fue utilizado en todos los lugares. Este aspecto permitirá comparaciones entre los hospederos y las varias especies de escarabajos descortezadores incluidos en el experimento. El experimento sigue en pie y los resultados completos no se presentarán hasta el próximo año.

C_E **Evaluation of Chemical and Biological Products for the Control of *Dendroctonus adjunctus* Blanford in the Mountains of Arteaga, Coahuila, Mexico**

C_S **Evaluación de productos químicos y biológicos para el control de *Dendroctonus adjunctus* Blandford en la Sierra de Arteaga, Coahuila, México**

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Evaluation of chemical and biological products for the control of *Dendroctonus adjunctus* Blanford in the Mountains of Arteaga, Coahuila, Mexico

According to the official Mexican Norm NOM-019-RECNAT-199, the use of chemical products for the control of bark beetles in Mexican forests, is currently limited to the insecticide Deltamethrin (Decis). However, the product is only effective against emerging adults and it is necessary to use other alternatives for the control of this pest. The objective of our study was to evaluate three different products for the control of bark beetles. The study was conducted in April in the Mountains of Arteaga during the time when adult pairs of the insect are constructing galleries and initiating oviposition. Logs 50 centimeters long were cut for the study from trees of *Pinus rudis* that had been attacked by *Dendroctonus adjunctus*; these logs were treated with different products such as Deltamethrin, Aluminum Phosphide, the fungus *Beauveria bassiana* and a control (no treatment). In the study, the best results were obtained with Deltamethrin and Aluminum Phosphide with no significant difference between the two detected (≤ 0.05). *B.bassiana* did not have any effect on mortality and it is assumed that these results were due to the spores and mycelium not being able to penetrate into the interior of the bark of the tree; therefore, not making contact with the body of the insect where the fungus must develop in order to cause mortality. Taking into account the presented results it can be concluded that Aluminum Phosphide can be an alternative to Deltamethrin.

Evaluación de productos químicos y biológicos para el control de *Dendroctonus adjunctus* Blandford en la Sierra de Arteaga, Coahuila, México

Según la Norma Oficial Mexicana NOM-019-RECNAT-1999, el uso de productos químicos para el control de insectos descortezadores en los bosques de México, se limita actualmente al insecticida Deltametrina (Decis); sin embargo dicho producto sólo puede ser utilizado con efectividad durante la emergencia de adultos, por lo que es necesario contar con otras alternativas que puedan ser aplicadas para el control de esta plaga. El presente estudio tuvo como objetivo evaluar tres diferentes productos para el control de descortezadores, el cual se llevó a cabo en el mes de abril en la Sierra de Arteaga, época en la que se observan parejas de adultos construyendo sus galerías he iniciando la oviposición. Se seleccionaron árboles de *Pinus rudis*

atacados por *Dendroctonus adjuctus* de los cuales se obtuvieron trozas de 50 cm de largo; éstas fueron tratadas con diferentes productos químicos tales como Deltametrina y Fosfuro de Aluminio, el hongo *Beauveria bassiana* y un testigo. De esta evaluación se obtuvo que los tratamientos con Deltametrina y Fosfuro de Aluminio son los que mejor resultado obtuvieron, no detectándose diferencia significativa entre ambos ($p \leq 0.05$). El tratamiento que no mostró mortalidad fue *B. bassiana*, se asume que este efecto se debe a que sus esporas e hifas no penetraron hacia el interior de la corteza del árbol, no pudiendo hacer contacto con el cuerpo del insecto, que es donde se desarrolla el hongo, para posteriormente causar la muerte de éste. Tomando en cuenta los resultados anteriores se puede concluir que el fosfuro de aluminio puede ser un substituto de la Deltametrina.

D_E Ongoing research on bark beetle monitoring and management in central and northern Mexico

D_S Investigación en marcha sobre el monitoreo y manejo de insectos descortezadores en el centro y norte de México

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Ongoing research on bark beetle monitoring and management in central and northern Mexico

Bark beetle control methods in Mexico are regulated by the Mexican Official Norm NOM-019-RECNAT. Direct control methods dictated by this norm remain almost the same as thirty years ago, consisting of sanitation cuts with their variants. Silvicultural practices seem to prevent bark beetle infestations in northern Mexico, but research is lacking on different aspects, among them, the inclusion of semiochemicals for bark beetle monitoring and management. Although the first experiments with bark beetle pheromones in Mexico date from three decades ago, for many years this subject has been largely unexplored in this country. Even today, very few Mexican scientists work on the chemical ecology of bark beetles. We believe that although the infrastructure puts some constrains for doing basic research on bark beetle pheromones in Mexico, this country offers a great diversity of natural scenarios to conduct field based research. Several studies have demonstrated that a pheromone lure for one bark beetle species may attract other bark beetle species and some antiaggregation pheromones and tree volatiles can have an antiaggregation effect on different species. Based upon this type of observations, our research group is starting a series of field experiments in central and northern Mexico, to evaluate effect of commercially available pheromones and tree volatiles on the aggregation and antiaggregation of *Dendroctonus* spp. Targeted species are *D. mexicanus, D. adjunctus, D. pseudotsuga,D. brevicomis* and *D. valens.* In addition, we are going to assess geographical variation in response of *D. valens* to key host monoterpenes Preliminary results from Aguascalientes suggest little attraction of *D. mexicanus* to frontalin + alpha pinene. In Saltillo, Coah. brevicomin + frontalin attracted *D. adjucntus, D. valens an D. parallelocollis*.

Investigación en marcha sobre el monitoreo y manejo de insectos descortezadores en el centro y norte de México

El control de escarabajos descortezadores en México están regulados por la Norma Oficial Mexicana NOM-019-RECNAT. Los métodos directos de control, dictados por esta norma, son casi los mismos de hace treinta años, consistiendo de las cortas de saneamiento con sus variantes. Las prácticas silviculturales parecen prevenir brotes de estos insectos en el norte de México; sin embargo, hay necesidad de investigación en diferentes aspectos, entre otros, la inclusión del uso de semioquímicos para el monitoreo y manejo de escarabajos descortezadores. Aunque los primeros experimentos con feromonas sobre escarabajos descortezadores en México datan de hace más de tres décadas, por muchos años esta línea de investigación ha estado inexplorada en este país. Aún en la actualidad, muy pocos científicos mexicanos trabajan en esta materia.

Nosotros creemos que aunque la infraestructura existente en México pone algunas limitantes para la investigación básica insectos descortezadores, este país tiene una gran diversidad de escenarios naturales para conducir investigación de campo. Varios estudios han demostrado que la feromona artificial desarrollada para una especie de escarabajo descortezador puede atraer a otras especies y que algunas feromonas antiagregantes y sustancias volátiles de árboles pueden tener un efecto antiagregante en especies diferentes. Basados en este tipo de evidencia, nuestro grupo de investigación está iniciando una serie de experimentos de campo en el centro y norte de México, para evaluar el efecto de semioquímicos disponibles comercialmente en la agregación y antiagregación de *Dendroctonus* spp. Las especies estudiadas son *D. mexicanus, D. adjunctus, D. pseudotsugae*, *D. brevicomis* y *D. valens*. Adicionalmente, se va a evaluar la variación geográfica en respuesta de *D. valens* a monoterpenos clave de hospederos. Los resultados preliminares de Aguascalientes sugieren poca atracción *de D. mexicanus* a la frontalita + alfa pineno. En Saltillo, Coah, la brevicomina+ frontalita atrajo a *D. adjunctus, D. valens y D. Parallelocollis.*

3:30-5:00 Concurrent Workshop 3 / Sesión Concurrente 3 **Salón Jazmín**

Insect Biodiversity and Community Structure in Forests
Biodiversidad de Insectos y Estructura de las Comunidades Forestales

Moderator/Moderador: Enrique Montes de Oca, Instituto de Ecología, A.C., Depto. Ecología y Comportamiento Animal. Apdo. Postal 63, Xalapa 91000, Veracruz, México

A_E The Northwest Forest Plan: Assuring the Persistence of Arthropod Biological Diversity and Ecological Function in Late-Successional Forests

A_S El Plan Forestal del Noroeste: Asegurando la Persistencia de la Diversidad de Artrópodos y la Función Ecológica en Bosques Sucesionales tardíos

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The Northwest Forest Plan: Assuring the Persistence of Arthropod Biological Diversity and Ecological Function in Late-Successional Forests

During the 1980's and early 1990's, there were numerous attempts by Federal land management agencies to define management of old-growth forests, followed by a series of challenges by environmental groups and the timber industry concerning these practices. In 1993, the Clinton Administration commissioned the Forest Ecosystem Management Assessment Team to produce management alternatives that would comply with existing laws and produce the highest contribution to economic and social well being. During this process, over 1,600 plant and animal species were evaluated to assess the persistence of species throughout their range. Currently, a list of mitigation measures for 304 species and four arthropod guilds (litter and soil dwelling arthropods, understory and canopy gap herbivores, coarse woody chewers and canopy herbivores) are incorporated in the Survey and Manage portion of the Northwest Forest Plan (NFP). While viability was the criteria used to determine the inclusion of individual species in Survey and Manage, the major concern for arthropod guilds was for the persistence of important ecological functions such as decomposition and nutrient cycling. Arthropod research was designed to provide resource managers with information to make any necessary modifications in the standards and guides for management practices within the NFP area. As part of this effort, studies on the effects of prescribed fire and stand thinning were conducted in southern Oregon. The influences of these activities on the abundance, species diversity, community structure and ecosystem function of litter, soil and coarse woody material dwelling arthropods are presented.

El Plan Forestal del Noroeste: Asegurando la persistencia de la diversidad de artrópodos y la función ecológica en bosques sucesionales tardíos

En los 80´s y principios de los 90´s, hubo numerosos intentos de las Agencias Federales de administración de tierras para definir el manejo de bosques, seguidos por los desafíos de grupos ambientalistas y de la industria maderera interesados en estas prácticas. En 1993, la Administración Clinton comisionó al Equipo de Evaluación del Manejo del Ecosistema Forestal para generar alternativas que cumplieran con las leyes vigentes y produjeran la más alta contribución al bienestar económico y social. En el proceso, se evaluaron más de 1,600 especies de plantas y animales para estimar la persistencia de especies. Actualmente, una lista de medidas atenuantes para 304 especies y cuatro gremios de artrópodos (del suelo y hojarasca, herbívoros del sotobosque y del dosel abierto, del dosel y masticadores de material leñoso) se incorporaron a la parte de Inspección y Manejo del Plan Forestal del Noroeste (PFN). La viabilidad fue el criterio para determinar la inclusión de especies individuales en la Inspección y Manejo, pero para los gremios de artrópodos se hizo énfasis en su persistencia para funciones ecológicas importantes como los ciclos de descomposición y de nutrientes. La investigación en artrópodos se diseñó para proveer información a los administradores de recursos y hacer cualquier modificación necesaria en los estándares y guías de prácticas de manejo dentro del área del PFN. Para ello, en el sur de Oregon se estudiaron los efectos del fuego prescrito y del aclareo de rodales en la abundancia, diversidad de especies, estructura de comunidades y la función ecosistémica de artrópodos del suelo, de hojarasca y de material leñoso.

B_E **Effects of tropical and temperate forests conversion on ground beetle (Coleoptera, Carabidae) assemblages**

B_S **Efectos de la conversión de bosques tropical y templado en los ensambles de escarabajos del suelo (Coleoptera, Carabidae)**

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Effects of tropical and temperate forests conversion on ground beetle (Coleoptera, Carabidae) assemblages

Concerns about the knowledge and conservation of biodiversity in forests have promoted the development of multiple approaches and strategies over the last decades. Before the accelerated rate of forests disturbance and overexploitation of natural resources it is necessary to find ways that allow us: to understand biodiversity patterns and processes, to register the biodiversity harbored in ecosystems and regions, to preserve biodiversity, to assess the effects of anthropogenic disturbances and resource management practices on biodiversity, as essential tasks for achieving sustainable development. In Mexico, the variety of at least seven recognized forest types is roughly divided in tropical (below around 1300 masl) and temperate forests (above 1500 masl.), all of them subjected to intensive pressure for natural resources use, deforestation and fragmentation due to plant/animal agricultural practices, and urbanization. Insect biodiversity assessment on these Mexican forests is an ongoing task but far to be accomplished yet despite current efforts. Studies with some insect groups such as dung beetles, used as indicator have been done to determine the different spatial levels of diversity in tropical and subtropical landscapes derived from human activities. Here, I present the results of tropical and temperate forests conversion effects on the assemblages of ground beetles, following an environmental (altitudinal) gradient. The response of this insect group to the landscape heterogeneity along the gradient is shown and the importance to maintain the forest patches (and increase through restoration) in order to keep higher diversity is stressed.

Efectos de la conversión de bosques tropical y templado en los ensambles de escarabajos del suelo (Coleoptera, Carabidae)

El interés en conocer y conservar la biodiversidad de los bosques ha promovido el desarrollo de múltiples enfoques y estrategias. Ante las perturbaciones en los bosques y la sobreexplotación de sus recursos es necesario encontrar vías de estudio para entender: los procesos y patrones de la biodiversidad, registrar la biodiversidad de ecosistemas y regiones, preservar la biodiversidad, evaluar los efectos de las perturbaciones antropogénicas y las prácticas de manejo en la biodiversidad, como tareas esenciales para alcanzar un desarrollo sustentable. En México, se reconocen siete tipos de bosques que gruesamente se dividen en tropicales (debajo de 1300 m

snm) y templados (arriba de los 1500 m snm). Todos sujetos a una intensa presión por el uso de sus recursos, la deforestación y fragmentación debido a prácticas agrícolas y ganaderas, y la urbanización. La evaluación de la biodiversidad de insectos de estos bosques es una tarea que está llevándose a cabo pero que aún está lejos de completarse a pesar de los actuales esfuerzos. Grupos de insectos, como escarabajos del estiércol, se han usado para determinar niveles espaciales de su diversidad en paisajes tropicales y subtropicales. Aquí, se presenta la conversión de bosques tropical y templado en mosaicos de uso de suelo y su efecto en los ensambles de escarabajos del suelo, siguiendo un gradiente ambiental (altitudinal). Se muestra la respuesta de estos insectos a la heterogeneidad del paisaje a lo largo del gradiente y se enfatiza la importancia de mantener los parches de bosque para tener una mayor diversidad.

C_E **Responses of epigaeic beetle communities to variable retention harvests in Canadian boreal-mixedwood forests.**

C_S **Respuesta de las comunidades de coleópteros epigeos al aprovechamiento con retención variable en los bosques boreales mixtos de Canada**

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Responses of epigaeic beetle communities to variable retention harvests in Canadian boreal-mixedwood forests

Conserving biological diversity in the face of industrial forest harvest and regeneration depends on recreating natural mosaics of stand composition and structure through forest management activities. We use responses of carabid and staphylinid beetles to test the ability of green-tree retention to conserve forest species in four different mixedwood cover-types. We evaluated the interaction between six levels of dispersed retention (0-2%, 10%, 20%, 50%, 75% and 100%) harvest and cover-type with respect to changes in community composition of both groups of beetles in 100 replicated boreal-mixedwood stands (>10 ha each) at the EMEND (Ecosystem Management Emulating Natural Disturbance) experiment in northern Alberta, Canada. Over 100,000 individual beetles representing 130 species were collected over the two-years. Cover-type strongly affected the relative abundance of habitat specialists and was more closely related to structural features associated with the forest floor such as coarse woody debris, cover of mosses, and cover of forbs than to overstory features. Ground beetles showed significant response to retention treatments particularly in late successional cover-types. Community composition of ground beetles differed significantly between 0-75% retention treatments and uncut control stands and was more apparent two-years post-treatment. Changes in ground beetle community composition were defined by the loss of habitat specialist species from stands with lower levels of retention. Rove beetle community composition showed significant response to retention treatments in all cover-types and was apparent both 1 and 2 years post-harvest. Reasons behind the different responses in these two taxa are discussed.

Respuesta de las comunidades de coleópteros epigeos al aprovechamiento con retención variable en los bosques boreales mixtos de Canada.

Ante el aprovechamiento industrial del bosque y su regeneración, la conservación de la diversidad biológica depende de recrear mosaicos naturales de rodales a través del manejo forestal. Usamos las respuestas de escarabajos carabidos y estafilínidos para probar la capacidad de retención de árboles jóvenes para conservar las especies forestales en cuatro diferentes tipos de cobertura de bosque mixto. Evaluamos la interacción entre seis niveles de retención (0-2%, 10%, 20%, 50%, 75% y 100%) y el tipo de cobertura respecto a cambios en las comunidades de ambos grupos de escarabajos en 100 réplicas de rodales boreales-mixtos (>10 ha cada uno) en el experimento EMEND (Manejo del Ecosistema Emulando Disturbio Natural) en el norte de Alberta, Canada. En dos años se colectaron más de 100,000 individuos representando 130 especies. El tipo de cobertura afectó la abundancia relativa de especialistas de hábitat y se relacionaron más

con rasgos estructurales asociados al suelo del bosque tales como restos leñosos, cobertura de musgos y cobertura de herbáceas, que con rasgos del arbolado. Los carábidos respondieron significativamente a los tratamientos de retención, particularmente en tipos de cobertura sucesionales tardíos. La composición de la comunidad de carábidos difirió significativamente entre 0-75% de retención y en rodales de control, y fue más aparente en dos años post-tratamiento. Los cambios en la comunidad de carábidos se definieron por la pérdida de especialistas de hábitat en rodales con bajos niveles de retención. La respuesta de la comunidad de estafilínidos fue significativa a tratamientos de retención en todos los tipos de cobertura y fue aparente tanto en el primero como en el segundo año post-aprovechamiento. Se discuten las razones de las diferentes respuestas de estos dos taxa.

Thursday, November 6 / Jueves, 6 de Noviembre

8:30-10:00 Panel / Ponencia Magistral — **Salón Stelaris**

Components of a national forest monitoring system
Componentes de un Sistema Nacional de Monitoreo

Moderator/Moderador: Jaime Villa, Gerente de Sanidad Forestal, CONAFOR, Mexico

A_E Monitoring the health of the forests of the United States
A_S Monitoreo de la Salud Forestal de los Estados Unidos

Borys Tkacz, National Program Manager, Forest Health Monitoring Program, United States Department of Agriculture - Forest Service, Washington, DC

Monitoring the health of the forests of the United States

The health of forest ecosystems of the United States (US) has gained popular attention in recent years because of concerns about air pollution, global climate change, native and exotic pests, and long-term resource management. Federal and State agencies have been working together since 1991 to develop a national program for monitoring and reporting on the status and trends of forest ecosystem health. The Forest Health Monitoring (FHM) program uses data from ground plots and surveys, aerial surveys, and other biotic and abiotic data sources and develops analytical approaches to address forest health issues that affect the sustainability of forest ecosystems. FHM covers all forested lands of the US through a partnership involving the USDA Forest Service, State Foresters, and other state and federal agencies and academic groups. This presentation will describe and highlight the major FHM activities including:

- **Detection Monitoring** – nationally standardized aerial and ground surveys to evaluate status and change in condition of forest ecosystems;
- **Evaluation Monitoring** - projects to determine extent, severity, and causes of undesirable changes in forest health identified through Detection Monitoring;
- **Intensive Site Monitoring** – to enhance understanding of cause-effect relationships by linking Detection Monitoring to ecosystem process studies and assess specific issues;
- **Research on Monitoring Techniques** – to develop or improve indicators, monitoring systems, and analytical techniques;
- **Analysis and Reporting** - synthesis of information from various data sources to produce issue-driven reports on status and change in forest health at National, Regional, and State levels.

Monitoreo de la salud forestal de los Estados Unidos

La salud de los ecosistemas forestales de los Estados Unidos de América (EUA) ha ganado considerable atención en años recientes, debido a preocupaciones sobre contaminación ambiental, cambio climático global, plagas nativas y exóticas y el manejo de recursos a largo plazo. Agencias Federales y Estatales han estado trabajando juntas desde 1991 para desarrollar un programa nacional para monitorear y reportar las condiciones y las tendencias de la salud de ecosistemas forestales. El Programa de Monitoreo de la Salud del Bosque (FHM) utiliza datos colectados de sitios permanentes, inspecciones, terrestres y aéreas; así como otras fuentes de datos bióticos y abióticos y desarrolla procesos analíticos para establecer condiciones de salud forestal que afectan la sustenabilidad de ecosistemas forestales. FHM cubre todos los terrenos forestales de EUA a través de convenios que involucran al Servicio Forestal, agencias forestales estatales y otras agencias estatales y federales y grupos académicos. Esta presentación describirá y señalará las principales actividades del programa FHM, incluyendo:

- **Monitoreo de Detección**- Inspecciones aéreas estandarizadas nacionalmente, para evaluar el estatus y el cambio en la condición de ecosistemas forestales;
- **Monitoreo de Evaluación**- Proyectos para determinar la extensión, severidad y causas de cambios indeseables en la salud forestal identificado a través de monitoreo de detección;

- **Monitoreo Intensivo de Sitios**- Para incrementar el entendimiento de las relaciones causa-efecto, por medio de la conexión entre el monitoreo de detección y los estudios de procesos del ecosistema para establecer condiciones específicas.
- **Investigación sobre Técnicas de Monitoreo**- Para desarrollar o mejorar indicadores, sistemas de monitoreo, y técnicas de análisis;
- **Análisis y Reporte de Resultados**- Síntesis de información de varias fuentes para producir reportes específicos sobre el estatus y el cambio en la salud forestal a niveles Nacional, Regional y Estatal.

B_E Monitoring System for Mexican Native and Exotic Forest Pests
B_S Sistema de Monitoreo para Plagas Forestales Nativas y Exóticas

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Monitoring system for Mexican native and exotic forest pests

Many forest pests are responsible of important changes in natural and managed ecosystems. This is particularly true for native species in which monitoring is not a common tool. Defoliators, bark-beetles and sucking insects are among the most cited around the world. International trade is also responsible for the movement of species to new areas, and there are several cases in which they have caused severe impacts on ecosystems. Monitoring is a necessary tool for management. Knowledge of forest pests in is still incomplete and more information on biology and ecology is needed. Distribution patterns of bark-beetles still incomplete, but efforts currently in progress will allow us to generate updated models. Monitoring is necessary for early detection and better management. Monitoring of bark-beetles of the genera *Dendroctonus*, *Ips*, *Pseudohylesinus*, *Scolytus* and others, will allow the generation of population dynamics models for theses pests. The creation of a monitoring system for *Dendroctonus mexicanus*, *D. adjunctus*, *D. frontalis*, *D. pseudotsugae* and potential introduction of exotic species is proposed. The use of pheromone traps on strategic points in our sierras as well as field works for native species will be implemented. For exotic species, an inspection program in our two borders, airports, main ports and important urban areas will be necessary for early detection.

Sistema de Monitoreo para Plagas Forestales Nativa y Exóticas

Muchas plagas forestales son responsables de cambios importantes en ecosistemas naturales y manejados. Esto es particularmente cierto para especies nativas en las cuales el monitoreo no es una herramienta común. Desfoliadores, descortezadores e insectos chupadores son de las principales plagas citadas en el mundo. El mercado internacional es también responsable por el movimiento de especies hacia nuevas áreas y hay varios ejemplos en los que insectos han causado impactos severos en ecosistemas. El monitoreo es una herramienta necesaria para el manejo. El conocimiento de plagas forestales es aún incompleto y se requiere mayor información sobre biología y ecología. El conocimiento sobre los patrones de distribución es incompleto, pero esfuerzos actualmente en progreso nos permitirán generar modelos actuales. El monitoreo es necesario para la detección temprana y mejor manejo. El monitoreo de descortezadores del género *Dendroctonus, Ips, Pseudohylesinus, Scolytus* y otros permitirá la generación de modelos de dinámica poblacional de estas plagas. Se propone la creación de un sistema de monitoreo para *Dendroctonus mexicanus*, *D. adjunctus*, *D. frontalis*, *D. pseudotsugae*; así como para insectos exóticos con potencial de introducción. Se implementará el uso de trampas con feromonas en puntos estratégicos en sierras, así como trabajo de campo para especies nativas. Para especies exóticas, será necesaria la implementación de un programa de inspección en las dos fronteras, aeropuertos, puertos marinos; así como áreas urbanas de importancia.

C_E Developing technologies for forest health protection in the United States
C_S Desarrollo de tecnología para la protección de la salud forestal en los Estados Unidos

Jim Ellenwood, USDA Forest Service, Forest Health Technology Enterprise Team (FHTET), Fort Collins, Colorado, USA (jellenwood@fs.fed.us)

Developing technologies for forest health protection in the United States

The USDA Forest Service's Forest Health Technology Enterprise Team is a national team for developing promising technologies for USDA Forest Service's Forest Health Protection staff. The team pursues developing technologies in information and treatment technologies. Several of team's program areas develop technologies that support many of the components of a national monitoring system. One of the components of a national monitoring system includes detection and monitoring for forest pests. Digital aerial sketchmapping is being developed to assist aerial survey specialists in producing accurate maps of detected forest health concerns. Remote Sensing techniques utilizing high-resolution digital imagery are being developed to augment detection surveys for intermediate and project-level planning. Data compilation and analysis is another component of a national monitoring system, which is being supported by geographical information systems technologies such as creating a national geospatial database of present and historic aerial surveys. Pest extensions for growth and yield models allow for the evaluation of the potential impacts of forest health concerns. National risk mapping allows for the visualization of the potential forest health problems on a national scale. Finally, management actions through the use of treatment technologies, such as aerial spray equipment and biocontrol applications, apply solutions to forest health problems. In the past year, the Forest Health Technology Enterprise Team participated in international cooperative projects. Opportunities exist to share technology and information with our Canadian and Mexican neighbors.

Desarrollo de tecnología para la protección de la salud forestal en los Estados Unidos

El grupo de iniciativa tecnológica de salud forestal del Servicio Forestal de los Estados Unidos es un equipo de cobertura nacional para desarrollar tecnología promisoria personal del departamento de protección de la salud forestal. Uno de los componentes del sistema de monitoreo nacional incluye la detección y el monitoreo de plagas forestales. Se está desarrollando el trazado digital de mapas para ayudar a los especialistas en inspecciones, mediante mapeo aéreo, a producir mapas más certeros sobre problemas de salud forestal. Se están utilizando técnicas de sensores remotos con imágenes digitales de alta resolución, para aumentar las inspecciones de detección para planeaciones intermedias y a nivel de proyecto. Otro componente del sistema de monitoreo nacional es la recopilación y análisis de datos, lo cual está siendo soportado por sistemas de información geográfica, como es la generación de una base de datos geoespacial nacional. La expansión de plagas y modelos de producción permiten la evaluación de impactos. El mapeo de riesgos al nivel nacional permite la visualización de problemas potenciales de salud forestal. Finalmente, mediante el uso de tecnologías de tratamiento tales como equipo de aspersión aérea y aplicaciones de control biológico, se aporta soluciones a problemas de salud forestal. El año pasado el grupo de iniciativa tecnológica de salud forestal participó en proyectos de cooperación internacional. Existen oportunidades de compartir tecnología e información con nuestros vecinos de Canada y México.

10:30-12:00 Concurrent Workshop 1 / Sesión Concurrente 1 **Salón Margarita**

Eucalyptus Pest Management
El manejo de las Plagas de Eucalipto

Moderator/Moderador: Guillermo Sánchez, INIFAP-Campo Experimental Pabellón. Km. 32.5 Carr. Aguascalientes-Zacatecas, Pabellón de Arteaga, Ags. C.P. 20660. (gsanchez@pabellon.inifap.conacyt.mx)

A_E Managing an ever-expanding community of herbivores on eucalypts in California.
A_S El manejo de una comunidad creciente de herbívoros en los eucaliptos de California, USA

Tim D. Paine, Department of Entomology, University of California, Riverside, CA 92521, USA
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Managing an ever-expanding community of herbivores on eucalypts in California

Eucalyptus was first planted in California in the mid-nineteenth century from seed brought from Australia and at least 90 different species of Eucalyptus can now be found in the state. The trees have proven to be drought hardy, well adapted to the soils, meet many different types of uses ranging from aesthetic to timber, and have been free from pests and diseases. The trees have been so widely planted that Eucalyptus species have become a dominant feature of the landscape. Beginning around 1985 with the introduction of the first major damaging pest, the eucalyptus longhorned borer (*Phoracantha semipunctata*) California has accumulated approximately one new insect species on Eucalyptus each year. Cultural management, host resistance, host preference, biological control, and insecticide applications have been investigated for management of individual insect pests. Unfortunately, tactics that are effective against one insect may disrupt management systems that are effective in controlling other members of the eucalyptus feeding guilds. For example, irrigation of trees to maintain bark moisture content greater than 60% can be effective in making trees resistant to borers, but may increase susceptibility of the trees to psyllids. Systemic insecticides may be effective against psyllids, but residues in honeydew, nectar, or body fluids may be detrimental to parasitoids released for biological control of other insects. Tree species selected for resistance to borers or psyllids may be susceptible to leaf beetles or to other psyllids. The challenge is to prevent invasions and to manage the insects as a community rather than as individual pests.

El manejo de una comunidad creciente de herbívoros en los eucaliptos de California, USA

Los eucaliptos fueron plantados por primera vez en California a mediados del siglo XIX con semillas procedentes de Australia y en la actualidad, pueden encontrarse por lo menos 90 especies de eucaliptos en dicho Estado. Estos árboles han probado ser resistentes a la sequía, bien adaptados a los suelos, tienen una gran variedad de usos, desde estéticos hasta la producción de madera, y han estado libres de plagas y enfermedades. Los eucaliptos han sido tan ampliamente plantados que se han convertido en una característica dominante del paisaje. Comenzando alrededor de 1985, con la introducción del barrenador cuernos largos (*Phoracantha semipunctata*), California ha acumulado aproximadamente una nueva especie de insecto sobre los eucaliptos cada año. El manejo cultural, la resistencia y preferencia de hospederos, el control biológico, y la aplicación de insecticidas han sido investigados para el manejo de especies de insectos en forma individual. Desafortunadamente, las tácticas que son efectivas contra un insecto, pueden irrumpir los sistemas de manejo que son efectivos para controlar otros miembros del grupo de insectos que se alimenta de los eucaliptos. Por ejemplo, la irrigación de árboles para mantener el contenido de humedad de la corteza arriba del 60% puede ser efectiva en hacer resistentes los árboles contra los barrenadores, pero pueden incrementar la susceptibilidad de los árboles a los psílidos. Por otra parte, los insecticidas sistémicos pueden ser efectivos contra los psílidos, pero los residuos en la mielecilla, néctar, o fluidos corporales pueden ser detrimentales para los parasitoides liberados que controlan a otros insectos. Las especies seleccionadas para la resistencia a insectos barrenadores o psílidos pueden ser susceptibles a escarabajos defoliadores o a otros psílidos. El reto es prevenir invasiones y manejar los insectos, como una comunidad en vez de manejarlas como especies individuales.

B_E **A study of the red gum lerp Psyllid *Glycaspis brimblecombei* in Durango, Mexico**
B_S **Estudio del psílido del eucalipto *Glycaspis brimblecombei* en Durango, México**

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A study of the red gum lerp Psyllid *Glycaspis brimblecombei* in Durango, Mexico

In August 2001, Alvarez and Trejo detected the red gum lerp psyllid *Glycaspis brimblecombei* Moore (*Gb*) in Durango (Alvarez and Piedra, 2001). Population fluctuation was followed in areas with abundance of eucalyptus trees. For counting and determining adults sex, it was used the suggested methodology by UC-Berkeley (Dahlsten, 2000). A weekly inspection was made to plastic yellow covers, coated with mineral oil on 20 randomly selected trees, from August 2001 to August 2003. It was proposed an evaluation scale to obtain the infestation level, to be included in the Format 1 suggested in the official norm NOM-EM-002-RECNAT-2002 (SEMARNAT, 2002). With that format the infestation was evaluated in four occasions, from 2001 to 2003. A search for potential enemies of *Gb* was made, as well as the distribution and establishment of *Psyllaephagus bliteus* (*Pb*), a wasp introduced to Durango City at the end of July 2002 (CONAFOR, 2002) from Guadalajara city, Jalisco. Results were: 1) graphics of the population fluctuation of *Gb*, 2) the relation of environmental factors on the population fluctuation of the pest, 3) distribution maps and infestation levels of *Gb* in the city, the advances of infestation and its return in the infestation process in a same given area, 4) a record of the presence of four Coccinelidae species, three Hemiptera species, one Neuroptera and six Arachnidae, 5) the introduced Hymenoptera species *Pb*, is well established and distributed in Durango city. It is concluded that the incidence of natural enemies and the environmental conditions have caused the population decrement of the pest for August 2003 that has allowed tree recovery when their defoliation do not reached high defoliation level. However, the following period of reduction in relative humidity is coming, what implies the population will increase again by the end of the present year.

Estudio del psílido del eucalipto *Glycaspis brimblecombei* en Durango, México

En agosto 2001, Álvarez y Trejo reportaron la presencia del psílido del eucalipto *Glycaspis brimblecombei* Moore (*Gb*) en Durango (Álvarez y Piedra, 2001). Se registró su fluctuación poblacional en las áreas con abundancia de árboles de eucalipto. Para el conteo y sexado de adultos, se usó la metodología sugerida por la UC-Berkeley (Dahlsten, 2000). Semanalmente se revisaron tapas plásticas amarillas, untadas con aceite mineral en 20 árboles elegidos al azar, de agosto 2001 a agosto 2003. Se propuso una escala de evaluación del nivel de infestación para agregarse al formato anexo a la NOM- EM-002-RECNAT-2002 (SEMARNAT, 2002), con la que se ha evaluado la ciudad en cuatro ocasiones, del 2001 al 2003. Se realizó la búsqueda de enemigos potenciales de *Gb* así como la distribución y establecimiento de *Psyllaephagus bliteus* (Pb), la avispa introducida en la ciudad de Durango a finales de Julio 2002 (CONAFOR, 2002) proveniente de la ciudad de Guadalajara, Jalisco. Los resultados fueron: 1) gráficas de la fluctuación poblacional de *Gb*, 2) relación de los factores ambientales sobre la fluctuación poblacional de la plaga, 3) mapas de distribución y niveles de infestación que presenta *Gb* en la ciudad, los avances de la infestación, así como el retroceso en el grado de infestación en una misma área dada, 4) el registro de la presencia de cuatro especies de Coccinelidae, tres especies de Hemiptera, una de Neuroptera, seis de Arachnidae, 5) la especie introducida de Hymenoptera, *Pb*, se encuentra establecida y bien distribuida en la ciudad de Durango. Se concluye que la incidencia de los enemigos naturales así como de las condiciones ambientales ha causado el descenso poblacional de la plaga para agosto 2003, lo que ha permitido la recuperación del arbolado cuando su defoliación no llegó a niveles altos e infestación. Sin embargo, continúa el siguiente período de reducción de humedad relativa, lo cual implica un aumento de la población para finales del presente año.

C_E **First successful biological control program of regum lerp psyllid (*Glycaspis brimblecombei*) in Mexico**

C_S **Primer programa exitoso de control biológico del psílido Eucalipto (*Glycaspis brimblecombei*) en México**

Gloria Iñiquez Herrera. Fideicomiso para el Programa de Desarrollo Forestal del estado de Jalisco (FIPRODEFO). Bruselas No. 626 Planta Alta, Col. Moderna, C.P. 44190, Guadalajara, Jalisco, México. (fitosanidad@prodefo.org.mx)

First successful biological control program of redgum lerp psyllid (Glycaspis brimblecombei) in Mexico

Starting in may 2001 FIPRODEFO began a biological control program against red gum lep psyllid (RGLP). A small group of parasitoid wasp *Psyllaephagus bliteus* was released in several parks of Guadalajara city and at the same time a massive reproduction program was initiated. Despite several initial drawbacks good brood production was obtained in a relatively short time. New parasitoids were released wherever high RGLP population levels where found. Data from the monitoring system deployed showed that parasitoid wasp was moving away from original releasing points. One year was enough time for the wasp to cover the entire Jalisco and nearby States. To date data from monitoring effort show low LGRP population level whereas parasitoid population level still increasing. Likewise, data coming from foliage survey showed that parasitism level between 70 to 80% was achieved. Foliage infestation and overall tree damage in Guadalajara and the vivinity have decreased apparently due to biological control effect. However as poor management and growing conditions of eucalyptus trees still it is most likely that many other trees would die as a result of combined effects of RGLP infestation, soil compaction, fire, drought, wood borers, root rot and vascular disease as well. The biological control program against RGLP initiated in Jalisco State by FIPRODEFO in collaboration with Universidad de Guadalajara, Guadalajara County and CONAFOR is the first successful documented classical biological control effort ever started against a forest pest in Mexico. The RGLP may never be completely erradicated in Mexico, therefore a continuous effort of parasitoid was reproduction should be considered. This is particularly important considering eventual parasitoid wasp population depletion because of adverse environmental conditions or lack of food.

Primer programa exitoso de control biológico del psílido Eucalipto (*Glycaspis brimblecombei*) en México

Los esfuerzos iniciados por el FIPRODEFO en mayo de 2001 en Guadalajara, en esta ciudad y otras ciudades del país, para controlar la plaga conocida como conchuela o psílido del eucalipto han dado resultados positivos. Dos años antes de lo pronosticado, la avispa parasitoide *Psyllaephagus bliteus* ha ejercido un control efectivo sobre el psílido *Glycaspis brimblecombei* en todo el estado de Jalisco y en los estados vecinos de Nayarit, Aguascalientes, Zacatecas, Michoacán, Guanajuato Colima, San Luis Potosí y Querétaro. En mayo de 2001 el FIPRODEFO realizó las primeras liberaciones de la avispa parasitoide en varios parques de la zona metropolitana de Guadalajara, a la vez que iniciaba el proyecto de Control biológico con un centro de reproducción masiva para el control de esta plaga. A pesar de los problemas iniciales, se logró en poco tiempo obtener nuevas crías para ser liberadas en puntos estratégicos en donde la conchuela continúa con un elevado grado de infestación. Del monitoreo que se realiza semanalmente indican que el establecimiento del parasitoide fue ampliando el área de cobertura hasta detectar que en tan solo un año, la avispa parasitoide se había desplazado por todo el estado de Jalisco y los estados vecinos mencionados. A la fecha, los monitoreos efectuados de la población del psílido muestran un bajo nivel de incidencia y una elevada presencia del parasitoide. Igualmente, el monitoreo de follaje nos muestran de un 70 a un 80 % de parasitismo. Los niveles de defoliación y daño de follaje han disminuido notablemente en el área metropolitana de Guadalajara y zona conurbana. Cabe destacar que la mortalidad inicial de arbolado fue acelerada por las malas condiciones de sitio en la que prevalecían muchos árboles de eucalipto. Por lo tanto, es muy factible que árboles de eucalipto sigan muriendo por factores como estrés hídrico, compactación de suelo, incendios, sequía prolongada, insectos barrenadores, pudriciones de raíz, lluvias torrenciales y enfermedades del sistema vascular. El programa iniciado por el FIPRODEFO en colaboración con la CONAFOR, la Universidad de Guadalajara (DMCyP) y el Ayuntamiento de

Guadalajara, en nuestro Estado, contra la conchuela del eucalipto es el primer caso documentado en la historia de nuestro país de control biológico exitoso para esta plaga forestal. El psílido del eucalipto, es una plaga llego para quedarse por lo que no es posible erradicar de nuestro país; por lo tanto, el mantenimiento de pies de cría y la reproducción de avispa parasitoide debe quedar considerado como un programa permanente de Control Biológico Clásico. Por otra parte, es probable que factores ambientales impidan el establecimiento generalizado de la avispa parasitoide en algunas zonas por condiciones no favorables.

D_E **Biological control of *Glycaspis brimblecombei* by the parasitoide *Psyllaephagus bliteus***
D_S **Control biológico de *Glycaspis brimblecombei* mediante el parasitoide *Psyllaephagus bliteus***

David Cabrían Tovar. Universidad Autónoma Chapingo. División de Ciencias Forestales. C.P. 56230, Chapingo, Estado de México.

Biological control of *Glycaspis brimblecombei* by the parasitoide *Psyllaephagus bliteus*

The psyllid *Glycaspis brimblecombei* was first detected in Mexico during September 2000 in Tijuana, Baja California. This insect, originally from Australia, became an important pest of red eucalyptus in Mexico. Due to the seriousness of the infestation, a classical biological control program was begun. In October 2001 the parasitoid *Psyllaephagus bliteus* was brought from California and rearing facilities were set up in Chapingo. Between July 2002 and April 2003 66,615 parasitoids were raised and released in Mexico Valley, and a monitoring program was established using yellow traps. Data from April 2003 indicate successful and rapid establishment of the parasitoid. Measures of parasitism or 5th instar nymphs indicate a significant impact on the psyllid population; in December 2002 indices of parasitism ranged from 4.16 to 58.5 percent in the different regions of the Valley. In the state of Michoacan parasitoids were also released and populations of both parasitoid and psyllid were monitored. In June, parasitism in Michoacan reached 85.7 percent of the nymphs at 5th instar. We conclude that the biological control of *Glycaspis brimblecombei* by *Psyllaephagus bliteus* has been a success.

Control biológico de *Glycaspis brimblecombei* mediante el parasitoide *Psyllaephagus bliteus*.

En septiembre de 2000, en Tijuana, Baja California, se detectó por primera vez al psílido *Glycaspis brimblecombei.* Este insecto, originario de Australia se convirtió en una plaga de gran importancia para los eucaliptos rojos que se utilizan en México. En los siguientes doce meses se dispersó en 24 entidades federativas del país. Debido a la importancia de las infestaciones, se decidió promover la aplicación de un control biológico clásico. En octubre de 2001, se logró la importación de un pie de cría de California. En Chapingo, México, se estableció una cría de parasitoides y entre julio de 2002 a abril de 2003, se lograron liberaciones por 66,615 ejemplares en el Valle de México; adicionalmente se estableció un programa de monitoreo de poblaciones con trampas amarillas. Los datos hasta abril de 2003 indican un establecimiento exitoso y rápido del parasitoide. El parasitismo medido en ninfa de quinto instar, indicó una influencia decisiva del parasitoide en el tamaño de la población del psílido; para diciembre de 2002, el índice de parasitismo varió de 4.16 al 58.5% en las diferentes regiones del Valle. En el Estado de Michoacán también se condujo un proyecto de liberación de parasitoides y monitoreo de las poblaciones de ambas especies, para junio de 2003 el parasitismo alcanzó el 85.71 % de la población de ninfas de quinto instar. Como conclusión se asume un control biológico exitoso de *Glycaspis brimblecombei* mediante el parasitoide *Psyllaephagus bliteus.*

10:30-12:00 Concurrent Workshop 2 / Sesión Concurrente 2 **Salón Magnolia**

Molecular Biology in Forest Entomology
Contribución de la Biología Molecular a la Entomología Forestal

Moderator/Moderador: Isabel Leal, Canadian Forest Service, Pacific Forestry Centre, 506 West Burnside Rd., Victoria, B.C. V8Z 1M5, CANADA

A_E Population genetics of *Dendroctonus valens* LeConte introduced to China
A_S Genética de poblaciones de *Dendroctonus valens* LeConte introducidas en China

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Population genetics of *Dendroctonus valens* LeConte introduced to China

The red turpentine bark beetle, *Dendroctonus valens* LeConte, is a native of North America and is distributed from Central America, Mexico, western US, Canada and northeastern US. Mostly dead or dying *Pinus*, *Picea* and *Abies* are hosts but unhealthy live trees are sometimes killed. Recently epidemic populations of this species have been discovered in Shaxi, Shaaxi, Hebei and Henan Provinces, China. So far over half million hectares of drought stressed, *Pinus tabuliformis* have been infested. Biology and ecology of the red turpentine bark beetle varies within its native range thus biological control (e.g. parasitoids and pheromones) must tailored to each population. Unknown origin(s) of the Chinese beetles hampers the implementation of biological control. This study uses a portion of the mitochondrial cytochrome oxidase I gene as a molecular marker to identify potential origin(s), size and occurrence of introduction(s) to China. Thirty-four DNA haplotypes were observed among 65 *D. valens* individuals from eight western US populations and four haplotypes were found in China. Ten parsimony informative characters were observed among the haplotypes. Parsimony analysis resulted in 8800 trees and the strict consensus of these trees was mostly unresolved. These data and analysis do not pinpoint the exact origin of the infestation. However the results suggest that the likely origin is the Pacific Northwest of North America. Also the occurrence of multiple haplotypes in China suggests that the population did not derive from one ancestor. Either multiple families arrived with one introduction of infested wood or several introductions of infested wood occurred.

Genética de poblaciones de *Dendroctonus valens* LeConte introducidas en China

El descortezador mayor del pino, *Dendroctonus valens* LeConte, es un escarabajo nativo de América del Norte, cuya área de distribución ocupa América Central, México, las regiones occidental y nororiental de Estados Unidos y Canada. En general, ataca ejemplares muertos o casi muertos de *Pinus*, *Picea* y *Abies,* pero a veces mata árboles vivos que están en malas condiciones de salud. En fecha reciente, se han descubierto poblaciones de esta especie en proporciones epidémicas en las provincias de Shaxi, Shaaxi, Hebei y Henan de China. Hasta ahora se ha infestado más de medio millón de hectáreas de *Pinus tabuliformis* estresados por la sequía. La biología y ecología del descortezador mayor del pino varían dentro de su área original de distribución, de modo que el control biológico (por ejemplo, con parasitoides y feromonas) debe adaptarse a cada población. Como no se conoce el o los orígenes de los escarabajos de esta especie que se encuentran en China, es difícil implementar el control biológico. En el presente estudio, se utilizó una porción del gen mitocondrial de la citocromo-oxidasa I como marcador molecular para identificar los posibles orígenes, y la magnitud y frecuencia de las introducciones de este insecto en China. Se observaron treinta y cuatro haplotipos de ADN entre 65 ejemplares de *D. valens* procedentes de ocho poblaciones del oeste de Estados Unidos y cuatro haplotipos se encontraron en China. Entre los haplotipos, se observaron tres caracteres indicativos de parsimonia. El análisis de parsimonia dio como resultado 8.800 árboles y el consenso estricto de esos árboles en su mayor parte quedó sin resolver. Esos datos y análisis no permiten establecer

con exactitud el origen de la infestación. Sin embargo, los resultados sugieren que el origen probable se encuentra en la región noroeste de la costa del Pacífico de América del Norte. Asimismo, la aparición de haplotipos múltiples en China sugiere que la población no procede de un único antepasado. O bien llegaron muchas familias en una sola introducción de madera infestada, o bien se introdujo madera infestada en varias ocasiones.

B_E **Reconstruction of *Dendroctonus* biogeographic pattern in Mexico as a base to analyze the population genetic structure of their species**

B_S **Reconstrucción del patrón biogeográfico de *Dendroctonus* en México como escenario para describir la estructura genética poblacional de sus especies.**

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Reconstruction of *Dendroctonus* biogeographic pattern in Mexico as a way to analyze the population genetic structure of their species

The biogeographic pattern of genus *Dendroctonus* in Mexico was determined based on sympatric areas analysis, the richness of species along geographic gradient, barriers and corridors, and the distribution of the main deformation axes. The results showed that this pattern is a consequence of the migration of boreal species occurring during Pleistocene with scarce speciation events. The high polyphagia and the wide ecological tolerance, characteristic of these species, have resulted in almost half of these species perceiving the environment as a corridor that favor their wide distribution. The fragmentation of the species distribution range in the mountainous regions of Mexico, point out that the resistance degree of the species to environment varies because of the topography, orientation, location, climate variation and type of host. Thus, the biogeographic distribution pattern shows how the species share the geographic space as result of the ecological and historical factors of each region. Therefore, the distribution pattern of *Dendroctonus* in Mexico gives us the opportunity to analyze by using molecular markers, how the geographic isolation affects the spatial genetic structure of populations at meso-scale level. In this work, three studies cases are analyzed to show how the biogeographic scenery has affected the *Dendroctonus* genetic population structure. Two of them are from the Faja Volcanica Transmexicana, and the other one from the Sierra Madre Occidental y Sierra Madre Oriental.

Reconstrucción del patrón biogeográfico de *Dendroctonus* en México como escenario para describir la estructura genética poblacional de sus especies

Con base en el análisis de la simpatría entre áreas, la riqueza de especies en un gradiente geográfico, la determinación de probables barreras y corredores, y los principales ejes de deformación en su distribución, se determinó el patrón biogeográfico de *Dendroctonus* en México. Los resultados indican que este patrón aparentemente se formó de manera indirecta por la migración de especies boreales durante el Pleistoceno, con escasos eventos de especiación. La elevada polifagia y la amplia tolerancia ecológica de sus especies han permitido que por lo menos la mitad de éstas perciban al ambiente como corredores que favorecen su amplia distribución. La fragmentación de sus áreas de distribución en los sistemas montañosos de México indica que el grado de resistencia de las especies al ambiente varía por la topografía, orientación, ubicación, variedad de clima, disponibilidad y tipo de hospedero. Así, los patrones de distribución muestran como las especies se reparten el espacio geográfico como respuesta a los factores ecológicos e históricos propios de cada región. De esta manera el patrón de distribución geográfica del género en México, provee el escenario que permite analizar el efecto del aislamiento geográfico sobre la estructura genética de las poblaciones en el espacio a nivel de mesoescalas, mediante el uso de

marcadores moleculares. En tres casos de estudio se analiza cómo el escenario biogeográfico ha afectado la estructura genética poblacional. Dos de ellos en la Faja Volcánica Transmexicana y uno en los sistemas montañosos de la Sierra Madre Occidental y la Sierra Madre Oriental.

C_E **Molecular and biochemical approaches to understanding the origin of aggregation pheromones in pine bark beetles**

C_S **Enfoques moleculares y bioquímicos para comprender el origen de las feromonas de agregación en el escarabajo descortezador del pino**

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Molecular and biochemical approaches to understanding the origin of aggregation pheromones in pine bark beetles

Bark beetles in the genera *Ips* and *Dendroctonus* rely on endogenous biosynthetic processes to produce their fatty acid-based and terpenoid aggregation pheromones. The core biosynthetic pathways used by scolytids for pheromone production have likely been present throughout the evolution of these beetles as these pathways are also used for the synthesis of very fundamental structural and metabolic molecules. With the monoterpenoid pheromone components ipsdienol and frontalin there is strong evidence that pheromone biosynthesis is tightly linked with the increased expression of genes of the isoprenoid pathway. In male *I. pini* these genes are expressed when the adult colonizes a new host; in male *D. jeffreyi* these genes are likely expressed with the new adult leaves the brood host. Techniques such as PCR and northern blotting have been applied to isolate and identify the genes related to pheromone biosynthesis. *In situ* hybridization using RNA from the gene sequences has been used to locate the site of pheromone biosynthesis. More recent biochemical work is focusing on the highly specific, late-stage reactions in pheromone biosynthesis. These reactions share some features with monoterpene synthesis in pines, and in this presentation I will discuss the interaction of monoterpenoid pheromone production by bark beetles and monoterpene production by pines.

Enfoques moleculares y bioquímicos para comprender el origen de las feromonas de agregación en el escarabajo descortezador del pino

Los descortezadores de los géneros *Ips* y *Dendroctonus* dependen de procesos biosintéticos endógenos para producir feromonas de agregación terpenoides y basadas en ácidos grasos. Las vías biosintéticas básicas que utilizan los escolítidos para producir feromonas es probable que hayan existido durante toda la evolución de estos escarabajos, ya que también se usan para sintetizar moléculas estructurales y metabólicas muy fundamentales. Con el ipsdienol y la frontalina, componentes monoterpenoides de feromonas, se tienen claros indicios de que la biosíntesis de feromonas está estrechamente vinculada con el aumento de la expresión de genes de la vía isoprenoide. En el macho de *I. pini,* esos genes se expresan cuando el adulto coloniza un nuevo hospedante; en el macho de *D. jeffreyi,* se expresan probablemente cuando el adulto recién formado abandona el hospedante de cría. Se han utilizado técnicas tales como PCR y *northern blotting* para aislar e identificar los genes relacionados con la biosíntesis de feromonas. Para localizar el sitio de biosíntesis de feromonas, se ha empleado la hibridación *in situ* utilizando ARN de las secuencias de genes. Los trabajos bioquímicos más recientes se concentran en las reacciones sumamente específicas que tienen lugar en las últimas etapas de la biosíntesis de feromonas. Esas reacciones comparten algunas características con la síntesis de monoterpenos en los pinos. En esta presentación, examinaré la interacción de la producción de feromonas monoterpenoides por los escarabajos descortezadores y la producción de monoterpenos por los pinos.

D_E Isolation of early-expressed genes from the white pine weevil feeding on resistant versus susceptible Sitka spruce trees

D_S Aislamiento de genes de expresión temprana del picudo del pino blanco según se alimente de ejemplares de *Picea sitchensis* resistentes o susceptibles.

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Isolation of early-expressed genes from the white pine weevil feeding on resistant versus susceptible Sitka spruce trees

Spruce (Picea) species are important timber producing conifers throughout British Columbia. Spruce plantations are under heavy attack by the white pine weevil, *Pissodes strobi* Peck (Coleoptera: Curculionidae). A number of clones and families of Sitka spruce, *Picea sitchensis* have suffered only very low rates of attack relative to other clones within field infestations of *P. strobi*. Our field studies show that feeding on these clones reduces oviposition by inhibiting or blocking ovarian maturation and by causing regression of the already developed ovaries. Resistance also strongly inhibits the transcription of the vitellogenin gene, whose expression is necessary for the maturation of eggs in weevils that are competent to start ovarian maturation. The above effects of resistance on weevil oviposition, ovarian regression, ovarian maturation, and transcription of vitellogenin gene can be can conveniently grouped together as the reproduction-reducing resistance mechanism. We have constructed cDNA libraries enriched for early expressed genes of white pine weevils in order to understand better this mechanism of resistance.

Aislamiento de genes de expresión temprana del picudo del pino blanco según se alimente de ejemplares de *Picea sitchensis* resistentes o susceptibles.

Las coníferas del género *Picea* son muy importantes en la producción de madera en toda la provincia de la Columbia Británica. Las plantaciones de *Picea* son fuertemente atacadas por el picudo del pino blanco, *Pissodes strobi* Peck (Coleoptera: Curculionidae). En comparación con otros clones, un número de clones y familias de la picea (*Picea sitchensis*) han sufrido índices muy bajos de ataque durante infestaciones de *P.strobi*. Nuestros estudios de campo muestran que, cuando el picudo del pino blanco se alimenta de estos clones, su oviposición se reduce por inhibición o bloqueo de la maduración de los ovarios y por regresión de los ovarios ya desarrollados. La resistencia del hospedante también inhibe fuertemente la transcripción del gen de la vitelogenina, cuya expresión es necesaria para la maduración de los huevos de los picudos que son capaces de iniciar la maduración de sus ovarios. En conjunto, dichos efectos de resistencia en la oviposición, la regresión o maduración de los ovarios, y la transcripción del gen de la vitelogenina se pueden considerar convenientemente un mecanismo de resistencia que disminuye la reproducción del insecto. Hemos construido genotecas de cADN enriquecidas para genes de expresión temprana del picudo del pino blanco para aislar dichos genes a fin de comprender mejor este mecanismo de resistencia.

10:30-12:00 Concurrent Workshop 3 / Sesión Concurrente 3 **Salón Jazmín**

North American Climate Patterns and Insect Outbreaks
Patrones Climáticos en Norteamérica y Brotes de Insectos

Moderator/Moderador: Brytten Steed, USDA Forest Service, Forest Health Protection, Ogden Field Office, Ogden, UT 84403, USA, and
Abraham de Alba Ávila, Campo Exp. Pabellón, (Terrestrial Plant Ecology) INIFAP-Ags, Ap. postal 20, Pabellón Arteaga, 20660, Aguascalientes, México

A_E **Global Warming: Local cooling? The case of the Mexican Altiplano: its possible influence on forests**

A_S **Calentamiento Global: ¿Enfriamiento local? El Caso del Altiplano Mexicano y sus posibles consecuencias a las masas forestales**

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Global Warming: Local cooling? The case of the Mexican Altiplano: its possible influence on forests.

Most research on the effects of global warming has been centered, at least initially, on the possible increase of sea level, the occurrence of extreme events and in the case of species, their shift in distribution. So far few researchers have measured climate changes at the local level, considering that it would not show any significant changes and even more difficult would be to establish correlations between climate and components of the biological systems. This is an effort to elucidate changes in temperature climate variables in climatologically stations across a latitudinal range comprising the Mexican Altiplano (26° 59' down to 20° 33') and a short altitudinal gradient, including the Sierra Fría, a small range in the states of Aguascalientes and Zac. Various stations were not used, either to their placement close to bodies of water that have moderated temperature trends, or because they were engulfed by urban growth. Latitudinal trends in this short gradient did not show any apparent pattern, mostly due to confounding effects of location as mentioned before. Nonetheless the most conspicuous trend is a significant annual T min trend, (7 out of 8 stations, $P<.05$) three of them negative (most extreme: –4.3 °C/century) and four positive (most extreme datum: 5.9°C/century). In terms of possible consequences to local forests and their insects, several scenarios are presented but all presuppose that lower minimum daily temperatures will change growth dynamics of trees and insect life cycles.

Calentamiento Global: ¿Enfriamiento local? El Caso del Altiplano Mexicano y sus posibles consecuencias a las masas forestales.

La mayoría de la investigación sobre el calentamiento global se ha centrado, al menos inicialmente, en el posible incremento del nivel del mar, la ocurrencia de eventos extremos y en el caso de las especies, cambios en sus distribuciones. Hasta ahora pocos investigadores han medido los efectos a nivel local, pensando que no se encontrarían cambios significativos y sería aun más difícil establecer correlaciones entre el clima y los componentes biológicos. Este es un esfuerzo para elucidar cambios en las variables climáticas de temperatura (mínima, máxima, promedio y oscilación) en estaciones con un intervalo altitudinal que comprende parte del Altiplano Mexicano (26° 59' a 20° 33') y un corto gradiente altitudinal que incluye la Sierra Fría, de Aguascalientes y Zacatecas. Varias de las estaciones no pudieron ser utilizadas, ya fuese por su localización cerca de cuerpos de agua que han moderado las fluctuaciones en temperatura, o porque han sido envueltas por el desarrollo urbano. No existió una tendencia uniforme o patrón, más que nada debido a los efectos confundidos mencionados anteriormente. No obstante se detectaron tendencias significativas en el caso de temperaturas mínimas anuales (7 de 8 estaciones, $P<0.05$), tres de éstas fueron negativas (la más extrema de -4.3 °C/siglo) y cuatro fueron positivas (la más extrema de 5.9 °C/siglo). En términos de posibles consecuencias a los bosques y sus insectos, se presentan varios escenarios pero todos presuponen que las temperaturas mínimas diarias menores cambiarán la dinámica de crecimiento de los árboles y los ciclos de vida de los insectos.

B_E **Drought, forest conditions, and bark beetles in Arizona: The Perfect Storm?**

B_S **Sequía, condiciones del bosque, y descortezadores en Arizona: ¿La Tormenta Perfecta?**

Joel McMillin, USDA Forest Service, Region 3 Forest Health Protection, Flagstaff, AZ, USA
John Anhold, USDA Forest Service, Region 3 Forest Health Protection, Flagstaff, AZ, USA
Mike Wagner, School of Forestry, Northern Arizona University, Flagstaff, AZ, USA
Jesse Anderson, Merriam-Powell Center for Environmental Research, Northern Arizona University, Flagstaff, AZ
Neil Cobb, Merriam-Powell Center for Environmental Research, Northern Arizona University, Flagstaff, AZ

Drought, forest conditions, and bark beetles in Arizona: The Perfect Storm?

The southwestern United States has been experiencing a landscape-level bark beetle outbreak in ponderosa and piñon pine forests. The combination of extended drought and unprecedented high tree density across the landscape is leading to extraordinary tree losses throughout the Region. The scale and pattern of this outbreak are described. Based on aerial surveys of ponderosa pine forests in Arizona, the area affected increased more than eighty-fold between 1999 and 2002, with nearly one million acres impacted in the last 4 years. Similar increases and impacts have occurred in piñon pine forests with some areas experiencing more than 90 percent mortality. Several species of bark beetles are involved: *Ips* and *Dendroctonus* species on ponderosa pine and *Ips confusus* on piñon pine. The majority of ponderosa pine attacks in 2001 and 2002 were initiated by *I. pini* and *I. lecontei*, while *Dendroctonus* species acted as secondary beetles. However, the relative roles of *Ips* and *Dendroctonus* beetles attacking ponderosa pine seem to be changing in 2003. The interactive effects of weather patterns and forest conditions on bark beetle populations in the Southwest are discussed. Impacts were originally highest in stress-prone sites (e.g., south-facing slopes, ridge tops, poor soils, and lower elevations) where drought and temperature effects would be predicted to be greatest. We conclude that drought-induced compromises in tree defenses and historic levels of tree densities have provided perfect conditions for unparalleled pine bark beetle outbreaks in the Southwest.

Sequía, condiciones del bosque, y descortezadores en el Arizona: ¿La Tormenta Perfecta?

El sudoeste de los Estados Unidos esta experimentando un brote de descortezadores al nivel del paisaje en bosques de *Pinus ponderosa* y de *Pinus edulis*. La combinación de la sequía extendida y de la alta densidad de árboles a través del paisaje está conduciendo a una pérdida extraordinaria de árboles de la región. Describimos la escala y el patrón de este brote. De acuerdo con inspecciones aéreas de los bosques de *Pinus ponderosa* en Arizona, el área afectada aumentó más de ochenta veces entre 1999 y 2002, con casi un millón de acres afectados en los 4 años pasados. Los aumentos y los impactos han ocurrido también en bosques de *P. edulis* con más de 90 % de mortalidad en algunas áreas. Varias especies de descortezadores están implicadas: especies de *Ips* y *Dendroctonus* en *P. ponderosa* y *Ips confusus* en *P. edulis*. En 2001 y 2002 la mayoría de ataques de *P. ponderosa* fueron iniciados por *I. pini* e *I. lecontei*, mientras que la especie de *Dendroctonus* actuaba como descortezadores secundarios. Sin embargo, en 2003, los papeles relativos de los descortezadores de los géneros *Ips* y *Dendroctonus* que atacan a *Pinus ponderosa* parecen estar cambiando . Se discuten los efectos interactivos de los patrones del tiempo y de las condiciones del bosque en poblaciones de descortezadores en el sudoeste. Los impactos fueron originalmente los más altos en sitios vulnerables al estrés (e.g., pendientes con exposición sur, partes altas de riscos, suelos pobres, y elevaciones más bajas) donde los efectos de la sequía y de la temperatura serían predichos para ser los más grandes. Concluimos que los compromisos en las defensas del árbol inducidos por la sequía y altas densidades de árboles han propiciado las condiciones perfectas para los brotes sin precedente del descortezador de los pinos en el sudoeste.

C_E **Climatic variation and bark beetle population dynamics**
C_S **Variación climática y las dinámicas de poblaciones de descortezadores**

Matt Ayres, Department of Biology, Dartmouth College, Hanover, NH 03755 USA

Climatic variation and bark beetle population dynamics

Climate can influence outbreak patterns of forest insects through (1) direct effects on insect survival and reproduction, or (2) indirect effects on host plants, natural enemies, or other community associates. We tested whether spatiotemporal variation in minimum annual winter temperature influences the epidemiology of outbreaks by *Dendroctonus frontalis* in the southeastern U.S. Laboratory studies have indicated that overnight air temperatures of < -16° C are generally lethal. We reconstructed historical patterns of minimum annual temperature and compared to interannual growth rates of *D. frontalis* populations from long term records. Surprisingly, numerous populations appear to have been unaffected by temperatures well below the measured lower lethal temperatures. The still untested suggestion is that local adaptation to

relatively cold climates can ameliorate direct climatic effects on *D. frontalis*. We have studied indirect effects of climate by testing whether populations of *Ips pini* in Minnesota tend to become self-perpetuating eruptions following a drought. Results supported the hypothesis that *I. pini* are normally regulated at endemic levels by resource limitations, but can switch to an epidemic state following a resource pulse from drought-killed trees. Endemic populations of *I. pini* may function chiefly as scavengers of trees that are dying for other reasons, while epidemic populations seem to escape resource limitations by attacking, killing, and reproducing within healthy trees. Under this multiple equilibrium model, bark beetles can amplify relatively short term climatic effects into self-perpetuating episodes of forest disturbance.

Variación climática y las dinámicas de poblaciones de descortezadores

El clima puede influir los patrones de brotes de insectos forestales por (1) influencias directas a la sobrevivencia y reproducción, o (2) influencias indirectas a las plantas hospederas, enemigos naturales, u otras partes de la comunidad. Examinamos como afectaba la epidemiología de un brote de *Dendroctonus frontalis* en el sureste del USA la variación espacial y temporal en temperaturas mínimas. Estudios en los laboratorios indican que, generalmente, temperaturas < -16° C durante la noche a la mañana son letales. Construimos patrones históricos de temperaturas mínimas y máximas, y los comparamos con los crecimientos anuales de poblaciones de *D. frontalis*. Muchas poblaciones no demostraron algún efecto negativo de temperaturas aún muy por debajo de la temperatura letal. Se ha sugerido que adaptaciones locales pueden ameliorar los efectos directos a *D. fronalis* por el clima. Para examinar los efectos indirectos del clima examinamos si las sequías iniciaban brotes auto-perpetuos de *Ips pini*. Los resultados están en favor de la hipótesis que *I. pini* normalmente está regulado a niveles endémicos por limites de recursos, pero pueden llegar a niveles epidémicos después de un incremento de recursos como ocurre después de una sequía. Las poblaciones endémicas de *I. pini* puedan funcionar como 'carroñeros' de árboles que mueren por otras causas. Mientras, las poblaciones epidémicas parecen escapar de las limitaciones de recursos mediante el ataque, la muerte, y la reproducción en árboles vivos y sanos. Bajo este modelo de muchos equilibrios, los descortezadores pueden amplificar los efectos de clima de relativamente corto tiempo hacia episodios auto-perpetuos de perturbación forestal.

1:00-2:30 Panel / Ponencia Magistral **Salón Stelaris**

Risks associated with Exotic Species
El Riesgo que Representan las Especies Exóticas

Moderator/Moderador: Robert A. Haack, USDA Forest Service, North Central Research Station

A_E Exotic Forest Insects Established in Mexico
A_S Insectos Exóticos Forestales establecidos en México

Amelia Ojeda, SEMARNAT, Sanidad Forestal, México
Oscar Trejo, SEMARNAT, Sanidad Forestal, México

Exotic Forest Insects Established in Mexico

Mexico's efforts to detect insect of quarantine importance started in 1999 and up to May 2003, 3 fungi and 37 insect genera of organisms were detected. However we lack information about those few that have been established. Most of the know introduced insects are important pests for urban trees and conifer plantations, among them Cooley spruce gall adelgid (*Adelges cooleyi*), black pineleaf scale (*Nuculaspis californica*), pine needle scale (*Chionaspis pinifoliae*), poplar clearwing borer (*Paranthrene dollii*), smaller European elm bark beetle (*Scolytus multistriatus*), eucalyptus lerp psillid (*Glycaspis brimblecombei*). Other important species are *Minthea rugicollis, Xylosandrus morigerus* and *Coptotermes havilandi*. Since the smaller European elm bark beetle, the poplar clearwing borer and the eucalyptus lerp psillid are important economic pests, there is a lot of information about them and Mexico had developed some management strategies to monitor and control the three of them.

Insectos exóticos forestales establecidos en México

No obstante que en el periodo de 1999 a mayo de 2003, se detectaron 3 géneros de hongos y 37 géneros de insectos de importancia cuarentenaria para nuestro país, se tiene poca información sobre que insectos se han establecido en México. La mayoría de los insectos que se sabe que son introducidos corresponden a especies de importancia para el arbolado urbano o para plantaciones de coníferas, entre ellos se encuentran el pulgón lanígero (*Adelges cooleyi*), las escamas negra y blanca del pino (*Nuculaspis californica y Chionaspis pinifoliae* respectivamente), el barrenador del álamo (*Paranthrene dollii*), el barrenador del olmo (*Scolytus multistriatus*), el psílido o conchuela del eucalipto (*Glycaspis brimblecombei*). Otros insectos son *Minthea rugicollis, Xylosandrus morigerus* y *Coptotermes havilandi.* Los insectos sobre los que se cuenta con mayor información son aquellos que tienen importancia económica, tal es el caso del barrenador del álamo y del olmo y más recientemente el psílido del eucalipto.

B_E Recent Exotic Forest Pests in the USA: An Update
B_S Insectos Exóticos Recientes del Bosque en EUA: Una Actualización

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Recent Exotic Forest Pests in the USA: An Update

There are more than 400 species of exotic (non-native) forest insects now established in the United States. Of these, about 80% are of European origin while about 20% are of Asian origin. However, in the past decade this trend has been reversed with most newly detected exotics being of Asian origin. For example, since 1990, we have found in the U.S. 1 exotic buprestid (*Agrilus planipennis*), 2 cerambycids (*Anoplophora glabripennis*, *Callidiellum rufipennis*), 3 conifer-infesting scolytid bark beetles (Hylurgops palliatus, Hylurgus ligniperda, Tomicus piniperda), 1 hardwood-infesting scolytid bark beetle (*Scolytus schevyrewi*), and 9 hardwood-infesting scolytid ambrosia beetles (*Ambrosiodmus lewisi*, *Euwallacea fornicatus*, *Xyleborinus alni* , *Xyleborus atratus*, *Xyleborus glabratus*, *Xyleborus pelliculosus*, *Xyleborus pfeili*, *Xyleborus similis*, *Xylosandrus mutilatus*). Of these 16 exotics, only 2 are currently under federal quarantine in the U.S.: *Anoplophora glabripennis* and *Tomicus piniperda*. The ash-infesting buprestid Agrilus planipennis, which was first found in 2002, is currently under state quarantine in Michigan and Ohio. This paper will discuss the geographic range, host range, survey efforts, and control efforts for each of the above exotic forest insects.

Insectos Exóticos Recientes del Bosque en EUA: Una Actualización

Hay más que 400 especies de insectos forestales exóticos (no-nativos) ya establecidos en EUA. De éstos, cerca del 80% son de origen Europeo, mientras que cerca de 20% son de origen Asiático. Sin embargo, en la última década esta tendencia se ha invertido, ahora la mayoría de los exóticos nuevos son de Asia. Por ejemplo, desde 1990, hemos encontrado en EUA: un bupréstido exótico (*Agrilus planipennis*), dos cerambícidos (*Anoplophora glabripennis*, *Callidiellum rufipennis*), tres escolítidos descortezadores de confieras (*Hylurgops palliatus*, *Hylurgus ligniperda*, *Tomicus piniperda*), un escolítido descortezador de latifoliadas (*Scolytus schevyrewi*), y nueve escolítidos ambrosiales de árboles latifoliados (*Ambrosiodmus lewisi*, *Euwallacea fornicatus*, *Xyleborinus alni*, *Xyleborus atratus*, *Xyleborus glabratus*, *Xyleborus pelliculosus*, *Xyleborus pfeili*, *Xyleborus similis*, *Xylosandrus mutilatus*). De estas 16 especies exóticas, solamente 2 están actualmente bajo cuarentena federal en EUA: *Anoplophora glabripennis* y *Tomicus piniperda*. *Agrilus planipennis*, que primero fue encontrado en Michigan en 2002, está ahora bajo cuarentena en los Estados de Michigan y Ohio. En este trabajo, voy a discutir el rango geográfico, los árboles hospederos, los esfuerzos de inspección y control para cada uno de estas nuevas especies exóticas.

3:30-5:00 Concurrent Workshop 1 / Sesión Concurrente 1 **Salón Margarita**

Plantation Pest Management: Contrasting tropical and temperate pest problems
Manejo de plagas en Plantaciones: Comparación de Plagas en Bosques Tropicales y Templados
Moderator/Moderador: René Alfaro, Natural Resources Canada, Pacific Forestry Centre, Canada

A_E **The threat of the ambrosia beetle, *Platypus sulcatus (=mutatus)* to forest resources of North America.**

A_S **La amenaza del coleóptero de Abrosia, *Platypus sulcatus (=mutatus)* a los recursos forestales de Norteamérica.**

The threat of the ambrosia beetle, *Platypus sulcatus (=mutatus)* to forest resources of North America

I describe the life cycle, hosts and damage caused by *Platypus sulcatus* (=*mutatus*) to resources of Argentina. This insect, native to the subtropical area of eastern South America, has extended its range in Argentina, reaching as far south as Neuquen in the Argentinean Patagonia. The damage is caused by the adults, which bore large gallery systems into living poplars, Salix and many other broadleaf species, including fruit trees such as walnuts and avocados. The galleries not only degrade the lumber, but weakened trees often fall during windstorms. A recent introduction to Italy, demonstrate that this insect can move long distances, from country to country, and therefore, presents a threat to broad leaf forest and orchard trees of North America.

La amenaza del coleóptero de Abrosia, *Platypus sulcatus (=mutatus)* a los recursos forestales de Norteamérica

Describo el ciclo de vida, los hospederos y el daño causado por *Platypus sulcatus (=mutatus)* a los recursos forestales de Argentina. Nativo de la región sub-tropical de Argentina, este insecto ha extendido, su hábitat, alcanzando hasta la región de Neuquen, en la Patagonia Argentina. El daño lo causan los adultos, los cuales excavan grandes galerías en el tronco de sauces, Álamos, y muchas otras latifoliadas, incluyendo frutales como nogales y paltas. Las galerías no solo causan degrade de la madera, sino que debilitan el tronco, causando el quiebre de los árboles cuando hay viento. Una reciente introducción a Italia demuestra que este insecto se puede mover largas distancias, de un país a otro, por lo cual representa una amenaza a los recursos forestales de Norteamérica.

B_E **Mixed native species plantations as a pest management approach in tropical West Africa.**

B_S **Uso de mezclas de especies nativas en el manejo de plagas en África tropical occidental.**

Michael R. Wagner, School of Forestry, Northern Arizona University, Flagstaff AZ 86011 USA
Paul P. Bosu, School of Forestry, Northern Arizona University, Flagstaff AZ 86011 USA

Mixed native species plantations as a pest management approach in tropical West Africa.

Many forest managers in tropical West Africa would prefer to grow native trees species in intensive plantations to meet local demand and produce high value timber for export. Unfortunately many of these high value species cannot be grown in plantations because of heavy depredation by insects. We review the life history of two important forest plantation pests in West Africa: *Phytolyma lata* (Homoptera: Psyllidae) and *Hypsipyla robusta* (Lepidoptera: Pyralidae) that severely damage plantations of their respective hosts, *Milicia* spp and mahogany (*Khaya* spp, *Entandrophragma* spp). We summarize our research demonstrating that reducing the density of the host tree in a mixed species plantation can be an effective control approach. Finally, we describe current research plans for testing several new plantation designs as an approach for managing forest pests.

Uso de mezclas de especies nativas en el manejo de plagas en África tropical occidental.

Muchos productores del África tropical occidental prefieren plantar las especies nativas en un sistema de plantación intensivo, para así cumplir con las demandas de los mercados interno y

externo. Desafortunadamente, la plantación de estas valiosas especies es dificultada por la degradación causada por los insectos forestales. En este trabajo revisamos el ciclo de vida de dos importantes plagas de las plantaciones forestales del Oeste africano: *Phytolyma lata* (Homoptera: Psyllidae) e *Hypsipyla robusta* (Lepidoptera: Pyralidae). También presentamos un resumen de nuestras investigaciones donde demostramos diferentes diseños de plantación y su uso potencial en el manejo de estas plagas.

C_E ***Thyrinteina arnobia:* the most important Lepidoptera defoliator of *Eucalyptus* plantations in Brazil.**

C_S ***Thyrinteina arnobia:* el desfoliador Lepidóptero más importante para *Eucalyptus* en Brasil**

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***Thyrinteina arnobia*: the most important Lepidoptera defoliator of *Eucalyptus* plantations in Brazil**

Cultivation of *Eucalyptus* species represents the main option for reforestation due to accelerated growth, recognized vigor, good precocity and adaptation of this species to many habitats. This has led to a significant expansion of reforestation with *Eucalyptus* in Brazil with the fourth largest area of homogeneous forests in the world. Brazilian plantations with *Eucalyptus* can be damaged by many pests from native Myrtaceae and *Thyrinteina arnobia* (Lepidoptera: Geometridae) is considered the main defoliating caterpillar of *Eucalyptus* in Brazil. Adaptation of insect pests to *Eucalyptus* is increasing and they are overcoming defense mechanisms of these plants which include essential oils. The objective was to know if these oils can affect natural enemies found in *Eucalyptus* plantations. *T. arnobia* was reared with *Eucalyptus grandis*, guava plants and mulberry tree. Eggs from adults reared with these plants were collected and offered to *Trichogramma maxacalli* (Hymenoptera: Trichogrammatidae). All individuals of these parasitoids died within 24 hours after contact with eggs of this Lepidoptera independent of their origin. On the other hand eggs washed were not parasitised but the most of the parasitoids were living after the same period. The results show that chemical compounds affecting this natural enemies, are produced by *T. arnobia* and not from plants.

***Thyrinteina arnobia*: el defoliador Lepidoptera más importante para *Eucalyptus* en Brasil**

El cultivo de la especie del *Eucalyptus* representa la opción principal para la repoblación forestal debido al crecimiento acelerado, al vigor reconocido, a la buena precocidad y a la adaptación de su especie a muchos habitats. Esto tiende a conducir a una extensión significativa de la repoblación forestal con el *Eucalyptus* en el Brasil con la cuarta área más grande del mundo con los bosques homogéneos. Las plantaciones brasileñas con el *Eucalyptus* se pueden dañar por muchos parásitos nativos de Myrtaceae y *Thyrinteina arnobia* (Lepidoptera: Geometridae) se considera la oruga la causante principal del deshoje del *Eucalyptus* en el Brasil. La adaptación del insecto al *Eucalyptus* está aumentando y están superando los mecanismos de la defensa de estas plantas que incluyan los aceites esenciales. El objetivo era saber si estos aceites afectan a enemigos naturales encontrados en plantaciones del *Eucalyptus*. *T. arnobia* fue alzado en el *Eucalyptus grandis*, en las plantas de la guayaba y el árbol de mora. Los huevos de los adultos alzados con estas plantas fueron recogidos y ofrecidos al *Trichogramma maxacalii* (Hymenoptera: Trichogrammatidae). Todos los individuos de este parasitoide murieron en el plazo de veinte y cuatro horas después del contacto con los huevos de este Lepidoptero, independientemente de su origen. Por otra parte los huevos lavados no fueron parasitizados, pero en la mayoría de los parasitoides estaba viviendo después del mismo periodo. Los resultados demuestran que los compuestos químicos que afectan a ambos enemigos naturales son producidos por *T. arnobia* y no de las plantas.

3:30-5:00 Concurrent Workshop 2 / Sesión Concurrente 2 **Salón Magnolia**

Latest Trends in Research and Management on Bark Beetles
Avances en la Investigación y el Manejo de Descortezadores

Moderator/Moderador: **Ronald F. Billings**, Texas Forest Service, 301 Tarrow, Suite 364, College Station, Texas 77840-7896 (rbillings@tfs.tamu.edu)

A_E Bark beetles in *Pinus brutia* in Cyprus
A_S Descortezadores en *Pinus brutia* de Chipre

William M. Ciesla, Forest Health Management International, 2248 Shawnee Court, Fort Collins, CO 80525 (WCiesla@aol.com)

Bark beetles in *Pinus brutia* in Cyprus

Cyprus is a small island located in the eastern Mediterranean. Approximately 40% of the area of the island is covered with natural vegetation: maquis or forest. The predominant tree species in the forests of Cyprus is the Mediterranean pine, *Pinus brutia*. Associated with this pine are three species of bark beetles of the family Scolytidae. The two primary species are *Tomicus destruens* and *Orthotomicus erosus*. *Tomicus minor* is a secondary species, which attacks after the other two species have made their attacks. *T. destruens* is most common during the winter and spring and *O. erosus* is more common in the summer. Presently the level of damage caused by these bark beetles is low. However, a program of forest sanitation is required to maintain this status.

Descortezadores en *Pinus brutia* de Chipre

Chipre es una isla pequeña ubicada en el Mar Mediterráneo oriental. Aproximadamente 40% de la superficie de esta isla esta cubierta de vegetación natural: maquis o bosque. La especie principal de árbol en los bosques de Chipre es el pino Mediterráneo, P*inus brutia.* Asociado con este pino esta un grupo de tres especies de gorgojos de la familia Scolytidae. Las dos especies mayores son *Tomicus destruens* y *Orthomicus erosus. Tomicus minor* es una especie secundaria que ataca después de las otras dos especies. *T. destruens* es más común durante el invierno y la primavera y, *O. erosus* es más común durante el verano. Actualmente el nivel de daño causado por estos escarabajos es bajo. Sin embargo, un programa de sanidad forestal es necesario para mantener este estado de baja actividad.

B_E Research Trends on Bark Beetles in Mexico
B_S Tendencias en la Investigación de Descortezadores en México

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Research Trends on Bark Beetles in Mexico

In Mexico, very few groups and individuals are doing research on bark beetles. The main trends are on basic biology, taxonomy and chemical ecology. INIFAP (Guillermo Sanchez, Ignacio Vasquez and Luis Torres), CONAFOR (Jaime Villa), UNACh (Rodolfo Campos and Tulio Méndez), CP (Armando Equihua) and ECOSUR (Jorge Macias) are involved in assessing bark beetle response to commercial semiochemicals by means of field trapping with multiple-funnel traps. IPN (Gerardo Zúñiga, Ramón Barrios and Fabian Vargas) and ECOSUR (Jorge Macias) are conducting research on pheromone production sites in *Dendroctonus* and phylogeny of the same genus. Most of these projects involve cooperation with several Federal and State Mexican Agencies and the USDA-FS. Most of this research is part of Bachelor and some Master theses that, unfortunately, is seldom published.

Tendencias en la Investigación de Descortezadores en México

En nuestro país existen pocos grupos e individuos que realizan investigación con descortezadores. Las principales tendencias son en biología básica, taxonomía y ecología química. INIFAP (Guillermo Sánchez, Ignacio Vásquez y Luis Torres), CONAFOR (Jaime Villa), UNACh

(Rodolfo Campos y Tulio Méndez), CP (Armando Equihua) y ECOSUR (Jorge Macías) están involucrados en evaluar las respuestas de los descortezadores a semioquímicos comerciales por medio de trampeos en campo y utilizando trampas multiembudos. IPN (Gerardo Zúñiga, Ramón Barrios y Fabián Vargas) y ECOSUR (Jorge Macías) desarrollan investigación que genera conocimientos en cuanto a los sitios de producción de feromonas en el género *Dendroctonus* y en la filogenia del mismo. La mayoría de los proyectos involucra la cooperación con agencias estatales y federales, así como el Servicio Forestal del Departamento de Agricultura de los Estados Unidos. La mayoría de esta investigación es parte de tesis de Licenciatura y algunas Maestrías y desafortunadamente la mayoría no están publicadas.

C_E Pine Bark Beetle Outbreaks in Central America: Impact and Management
C_S Plagas del descortezador de pino en América Central: Impacto y manejo

Ronald F. Billings, Texas Forest Service, 301 Tarrow, Suite 364, College Station, Texas 77840-7896 (rbillings@tfs.tamu.edu)

Pine Bark Beetle Outbreaks in Central America: Impact and Management

Severe outbreaks of the southern pine beetle, *Dendroctonus frontalis,* (or closely related species) developed in native forests of *Pinus caribaea* and *P. oocarpa* in several countries of Central America between 1999 and 2002. In total, more than 70,000 hectares were destroyed, with major losses in Belize, Nicaragua, Honduras and Guatemala. Response to these outbreaks varied markedly among countries, based on the presence or absence of organized pest management programs. In March 2002, the author evaluated the status of bark beetle outbreaks in each affected country and made short- and long-term recommendations for pest management. With these recommendations and previous experiences in Honduras as a foundation, foresters and pest specialists from seven Central American countries met in August 2002 in Siguatepeque, Honduras to jointly develop a regional strategic plan for bark beetles. This plan recently was accepted by the Central American Environment and Development Commission, consisting of the ministers of agriculture of each country.

Plagas del descortezador de pino en América Central: Impacto y manejo

Ataques graves del descortezador del pino del sur, *Dendroctonus frontalis,* (o de especies estrechamente relacionadas) se desarrollaron en bosques nativos de *Pinus caribaea* and *P. oocarpa* en varios países de América Central entre 1999 y el 2002. En total, más de 70.000 hectáreas fueron destruidas, con las mayores pérdidas ocurridas en Belice, Nicaragua, Honduras y Guatemala. La respuesta a estos ataques varió mucho entre los distintos países, y se basó en la presencia o ausencia de programas organizados de manejo de pestes. En marzo del 2002, el autor evaluó el estado de los ataques de los descortezadores de pino en los países afectados e hizo recomendaciones a corto y largo plazo para el manejo de la peste. Con estas recomendaciones y con la experiencia previa en Honduras como base, los ingenieros forestales y los especialistas en pestes de siete países centroamericanos se reunieron en Siguatepeque, Honduras, para que en conjunto desarrollaran un plan estratégico regional para atacar los descortezadores de pino. Este plan recientemente fue aceptado por la Comisión Centroamericana de Ambiente y Desarrollo, formada por los Ministros de Agricultura de cada país.

D_E Recurrence of Mountain pine beetle in British Columbia, Canada
D_S Recurrencia de las epidemias del descortezador del pino (mountain pine beetle: *Dendroctonus ponderosae*) en la Columbia Británica, Canada.

René Alfaro, Natural Resources Canada, Pacific Forestry Centre, CANADA
Brad Hawkes, Candian Forest Service, Victoria, BC, CANADA
Paula Vera, Blackwell Associates, Vancoucer BC, CANADA
Rochelle Campbell, Candian Forest Service, Victoria, BC, CANADA
Terry Shore, Candian Forest Service, Victoria, BC, CANADA
Steve Taylor, Candian Forest Service, Victoria, BC, CANADA

Recurrence of Mountain pine beetle in British Columbia, Canada

The mountain pine beetle (*Dendroctonus ponderosae* Hopk.) (MPB) (Coleoptera: Scolytidae) is an aggressive bark beetle, whose populations periodically increase to outbreak levels in infestations that kill thousands of trees, and is catalogued as one of the major natural disturbance agents in North America. The main host species is lodgepole pine (*Pinus contorta* var. *latifolia* Engelm.), but other conifers are also attacked. Current forest and ecosystem management tendencies require that we understand the periodicity of these outbreaks so we can plan ahead before outbreaks develop. We use the methods of dendrochronology to study tree rings from susceptible areas in order to establish the recurrence of infestations. Outbreaks are detected in trees that survive outbreaks as they experience sudden releases due to canopy thinning by beetles and which appear as show periods of wide rings in the tree ring sequence.

Recurrencia de las epidemias del descortezador del pino (*Dendroctonus ponderosae*) en la Columbia Británica, Canada

El escarabajo descortezador del pino, (*Dendroctonus ponderosae* Hopo.) (MPB) (Coleoptera: Scolytidae), es un insecto agresivo, cuyas poblaciones aumentan periódicamente a niveles de epidemias que resultan en la mortalidad de miles de árboles. Por esto se le cataloga como uno de los agentes de perturbación del bosque mas importantes de Norte América, causando alta mortalidad al pino contorta (*Pinus contorta* var. *latifolia* Engelm.) y otras especies de coníferas. Las tendencias actuales que rigen el manejo forestal requieren que cuantifiquemos la periodicidad de estas infestaciones, para así poder planificar la disponibilidad de madera. En este trabajo usamos los métodos de la dendrocronología para cuantificar la recurrencia de las infestaciones de este insecto. Detectamos las epidemias de escarabajo examinando los anillos de crecimiento de árboles que sobreviven a las infestaciones. Los epidemias aparecen como Períodos de aumento del crecimiento anual debido al raleo causado por la mortalidad selectiva en el rodal.

3:30-5:00 Concurrent Workshop 3 / Sesión Concurrente 3 **Salón Jazmín**

Current Status on Forest Insects in the Western United States, Canada, and Mexico
Estado Actual de Insectos Forestales en el Oeste de Los Estados Unidos, Canada, y México

Moderator/Moderador: José F. Negrón, USDA Forest Service, Rocky Mountain Research Station, Fort Collins, Colorado, USA

This will be an informal workshop where attendees from Mexico, Canada, and the United States will share information regarding current forest insect conditions. This session is held every Western Forest Insect Work Conference to keep forest entomologists in the West abreast of forest insect conditions and issues surrounding their management.

Este será un taller de trabajo informal en el cual los participantes de México, Canada y los Estados Unidos presentaran información sobre condiciones actuales de insectos forestales. Durante las conferencias de la WFIWC se acostumbra conducir este taller para mantener entomólogos forestales del oeste al tanto de las condiciones actuales de insectos forestales y asuntos relacionados a su manejo.

Participants Include / Participantes Incluyen:

Debra Allen-Reid, USDA Forest Service, Forest Health Protection, Albuquerque, New Mexico, USA
Daniel Cluk, USDA Forest Service, Forest Health Protection, Susanville, California, USA
Tom DeGomez, Arizona State Forest Health Specialist, Flagstaff, Arizona, USA
Tom Eager, USDA Forest Service, Forest Health Protection, Gunnison, Colorado, USA
Karl Jorgensen, USDA Forest Service, Forest Health Protection, Boise, Idaho, USA
Joel McMillin, USDA Forest Service, Forest Health, Flagstaff, Arizona, USA
Iral Ragenovich, USDA Forest Service, Forest Health Protection, Portland, Oregon, USA
Dwight Scarbrough, USDA Forest Service, Forest Health Protection, Boise, Idaho, USA
Sheri Smith, USDA Forest Service, Forest Health Protection, Susanville, California, USA
Brytten Steed, USDA Forest Service, Forest Health Protection, Ogden, Utah, USA

Jaime Villa Castillo, Forest Health Manager, CONAFOR, Guadalajara, Mexico
Sunil K. Ranasinghe, Alberta Environmental Protection, Forest Health Branch, Edmonton, AB. CANADA

Northern Region - Region 1
Brytten Steed

Mountain pine beetle (*D. ponderosae*) has become the most significant mortality-causing agent in the Region. In 2002 (data for '03 not yet compiled) more than 517,000 acres were infested in northern Idaho and western Montana on all host species. That figure will probably exceed 600,000 acres in '03. Douglas-fir beetle (*D. pseudotsugae*) is still prevalent in western Montana, especially in areas affected by fires of 2000; less so in northern Idaho. About 100,000 acres are currently infested. Fir engraver (*Scolytus ventralis*)-killed trees were noted on more than 118,000 acres—the most ever recorded in the Region. Most of that was in northern Idaho. Western balsam bark beetle (*Dryocoetes confusus*)-caused mortality in subalpine fir (*Abies lasiocarpa*) stands was found on about 169,000 acres. A 6,000-acre outbreak of spruce beetle (*D. rufipennis*) was detected in Yellowstone National Park in '02 and expanded somewhat in '03. Western pine beetle (*D. brevicomis*) and engraver beetles (*Ips* spp.) increased some in '03, but are not at unusually high levels. Much of the Region continues to suffer from effects of a 4- to 5-year drought.

Rocky Mountain Region – Region 2
Tom Eager

Drought and bark beetles:

Much of the Rocky Mountain region has suffered from drought conditions for the past several years. The drought was extreme during 2002 with many records being set in various categories of drought indices. Drought conditions were abated during 2003, but tree mortality continued to occur at a high level.

This period of drought has also been marked by very high levels of tree mortality due to bark beetle activity. Lack of moisture contributes to increased bark beetle activity in two ways. First, the stress induced by a drought makes host trees more vulnerable to death by the beetles. The primary defense of trees against bark beetle attack is production of resin and when moisture is unavailable to a host tree, it is unable to produce this resin for defense. Secondly, this lack of resistance in host trees allows attacking bark beetles to more easily colonize their hosts. The relative abundance of susceptible hosts allows the populations of damaging agents to increase dramatically. With large amount of available food, bark beetles can increase their numbers and these large populations kill even more susceptible hosts. Thus, it is not surprising that large numbers of host trees can be killed in a relatively short period of time. While the extreme drought conditions of 2002 decreased during 2003, the large insect populations remained and tree mortality occurred on a large scale.

Virtually every species of conifer in all of the major Rocky Mountain cover types experienced a high degree of mortality in 2003. Overall, the distribution of the tree mortality was rather spotty, some forests suffered extensive, intense mortality, while other forested area escaped relatively unscathed. However, if drought conditions continue, many experts predict that tree mortality will continue to increase over time. Long-term weather patterns will be a major determinant of future forest conditions.

Most Damaging Insects:

Mountain pine beetle (*Dendroctonus ponderosae*):

Colorado

Outbreaks have reached epidemic proportions near Lake Granby Area (Grand County) and in the Upper Arkansas Valley (Chaffee County). There are numerous places where beetle populations are dramatically increasing in Eagle, Jackson, a Custer, and Park Counties.

Pine mortality due to mountain pine beetle on the Pike National Forest is low at this time with only 7000 trees recently killed. Mountain pine beetle populations are increasing on the Routt National Forest with over 15,000 pines dead.

In the southern portion of the state there are two major outbreaks of mountain pine beetle that have been occurring for the past several years. In Chaffee County, mountain pine beetle have killed large numbers of ponderosa pine. This outbreak originated in the upper Arkansas River valley, but this activity has spread to the east, roughly following the course of the river, but spreading to the Wet Mountains, the eastern slope of the Sangre de Cristo Mountains, and forested areas to the south of Canon City.

The other major outbreak has occurred in the vicinity of Vail Valley along the Interstate 70 corridor. Here mountain pine beetle have killed large numbers of their other primary host, lodgepole pine. Mortality was originally concentrated near the Vail ski area and adjacent urban interface areas, but this activity seems to be abating somewhat with stands of lesser susceptibility remaining fairly intact. Beetle activity now appears to be moving north of the Interstate with areas of increasing mortality in the Redstone Canyon/Piney Lake area. Many of these lodgepole pine stands are at fairly high risk to mountain pine beetle activity, and significant mortality can be expected into the future.

There are many areas with scattered, fairly intense pockets of mountain pine beetle activity. Portions of the San Juan, Rio Grande, Gunnison, and Uncompahgre Nat'l Forests all have areas of significant mortality due to mountain pine beetle. While this bark beetle activity is not on a scale represented by either the Arkansas Valley or Vail Valley outbreaks, drought conditions could encourage beetle activity and cause significant epidemics. In general, mountain pine beetle populations are high throughout the state and able to respond rapidly to large expanses of susceptible hosts.

Wyoming

Shoshone National Forest experienced thousands of whitebark pines and limber pines dying due to activities of this beetle. Mountain pine beetle, along with some forest diseases, are playing a significant role in limber pine and whitebark pine decline on more than 58,000 acres of white pines in western Wyoming.

This beetle species is also causing considerable damage in ponderosa pine in the lower foothills along the eastern flank of the Bighorn Mountains from Johnson County north into Sheridan County on state, private, and federal lands. With populations in this area of the Bighorns increasing, tree mortality caused by this beetle will be highly visible in 2003.

Small pockets of dead lodgepole and ponderosa pines, recently killed by mountain pine beetle, were characteristic in the Laramie Mountain, Sierra Madre, and Snowy Mountain Ranges of southcentral and southeastern Wyoming. Many of these pockets contained over 150 dead trees.

Mountain pine beetle continues to infest large areas of the Wyoming side of the Black Hills. Crook and Weston Counties contained infestations with over 15,000 trees killed in this area. Populations in this area increased from 2001 to 2002 with pockets of 20-50 dead ponderosa pines common in northeastern Wyoming.

South Dakota

Mountain pine beetle has caused intense and extensive ponderosa pine mortality throughout the Black Hills of South Dakota over the last 3 years. Aerial surveys detected a large and expanding mountain pine beetle infestation in the Beaver Park area of the northern Black Hills. Ground surveys found an overall average of 37 trees per acre killed since 2000, about half being currently infested. The area south of Deerfield Lake also has a large and expanding mountain pine beetle infestation. Since 2000, an average of 24 trees per acre has been killed there, with over 60 trees per acre currently infested. Continued evaluation of these outbreaks indicates that beetle populations are still increasing and will cause dramatic levels of future tree mortality.

As more and more available host trees are killed in the outbreak areas, the large beetle populations expand to surrounding forest sites. The majority of the infestations are located on National Forest lands, although more private and state lands are now becoming infested. In 2002, mountain pine beetle affected approximately 15,000 acres of private forestland in addition to lands within the Black Hills National Forest. Private lands adjacent to the National Forest are beginning to suffer considerable mortality and forest landowners are thinning. Sanitation, salvage, and thinning activities are ongoing on private and public lands, including suppression in areas along the

private/public land interface. These practices are intended to mitigate beetle impacts and also reduce the fire hazard and negative impacts on water quality.

Spruce beetle, *Dendroctonus rufipennis*, attacks Engelmann and blue spruce in Colorado and Wyoming forests. Listed below are current places with spruce beetle outbreaks/epidemics.

Colorado

Spruce beetle activity is widespread throughout southern Colorado. The majority of spruce beetle activity is occurring in scattered pockets of less than 100 acres, but there are a number of sites where large numbers of mature spruce have been killed over extensive areas. In terms of the scattered activity, there are about 30 known spruce beetle sites on the White River, Grand Mesa, Gunnison, Uncompahgre, San Juan, and Rio Grande National Forests.

The Baylor Park outbreak increased in size and scope, despite 2003 being an "off" year in their two year life cycle. Ground surveys located several thousand new hits in this area north of Glenwood Springs and the outbreak area increased in size as well. Some salvage operations were conducted, but the recruitment of newly attacked trees far outstripped any removal of infested hosts.

A new outbreak of spruce beetle was located on the Conejos Ranger District of the Rio Grande National Forest. This new area, dubbed "County Line" showed a dramatic increase in beetle activity in just one year. Several hundred trees were mass attacked and killed over a fairly extensive area. The sudden rapid increase in spruce beetle activity illustrates the explosive nature of spruce beetle populations.

Hundreds of thousands of spruce were killed in Routt and Jackson Counties as the spruce beetle outbreak continues to expand and intensify in the area of the Routt Divide Blowdown. Main areas affected are north of Rabbit Ears Pass to the Wyoming border on the Gore.

Nearby in the Flat Tops of Rio Blanco, Garfield, and Moffat counties, CO, numbers of spruce beetle-killed trees are increasing. Spruce beetle caused mortality from aerial survey estimates about 3,500 spruce trees destroyed.

Preventive spraying may be necessary to protect live, high-value trees on private and public lands in the near future in areas with active spruce beetle populations.

Wyoming

Spruce beetle attacked hundreds of thousands of Engelmann spruce in Wyoming in 2002. In the Bighorn Mountains of north-central Wyoming, the Shell Reservoir and Ten Sleep Canyon areas are experiencing epidemic levels of spruce beetle. Following small blowdown events in 1997-1999 in south-central Wyoming, spruce beetle populations are increasing in the Sierra Madre and Snowy Mountain Ranges of the Medicine Bow National Forest. Several large spruce beetle infestations were detected along stream bottoms in the Sierra Madre mountain range.

Large pockets of spruce tree mortality caused by this beetle were observed in Yellowstone National Park east of Yellowstone Lake and in the Teton and Absaroka Mountain Wilderness Areas in western Wyoming. These infestations started in the wilderness areas and National Park, and now have moved out to impact large areas of state, BLM and other National Forest lands. Spruce beetle populations also increased in the Wind River Range, partly in conjunction with fires that occurred in the area over the past few years.

Ips - Problems with pine and spruce engraver beetles, Ips spp., were found in ponderosa pine, piñon pine, lodgepole pine, Jack pine, and Engelmann spruce in the Region. The Ips problem will likely disappear when the drought subsides.

Colorado

The amount of tree mortality due to Ips continues to skyrocket, in combination with dwarf mistletoe infection and drought. It is very difficult to distinguish faders resulting from the impact of various *Dendroctonus* bark beetles. In particular, this increased Ips – dwarf mistletoe – drought mortality greatly complicates aerial surveys.

Perhaps the most dramatic example of tree mortality in the central Rocky Mountains has been the extensive loss of pinyon pine. This outbreak is occurring on a huge scale, with pinyon trees being killed in large numbers throughout their range. Several species of pinyon are being affected, from New Mexico to California and south into Mexico.

In Colorado, vast areas of *Pinus edulis* have been killed by the bark beetle *Ips confusus*. This mortality has been particularly intense in the southern portion of the state with many thousands of acres experience the loss of a high percentage of mature pinyon. Again, the drought conditions of the past several years are the root of the situation, but fairly high tree densities and the overall even-age status of the pinyon stands are contributing factors.

In the most highly affected, southern portion of the state, many stands have lost 90% of the mature pinyon. The worst of this mortality occurs in the pinyon stands around Durango, Cortez and Dolores. Moving further north, the mortality is more scattered with some sites of intense mortality.

The future of the outbreak depends greatly upon future weather conditions. Even with weather conditions favorable to healthy pinyon, it may take some time before bark beetle numbers return to a more endemic level. In any case, the slow growth of pinyon stands means that many areas will not regain a mature pinyon component for some time to come.

The 2002 fire situation greatly increased public willingness and demand for mitigation work and we are seeing Ips responding to the great amounts of greenwood cutting at these sites. Greater than normal incidence of Ips beetles in lodgepole has been reported from a number of locations near Fraser, Monarch Pass, and Boulder County.

Ips hunteri attacks on urban Colorado blue spruce increased in 2002 in the Greeley, Denver, and Colorado Springs areas. About 40 large Colorado blue spruce were removed because of I. hunteri in Fort Collins. A total of 295 trees have been infested in the City of Denver, with neighboring suburbs such as Wheat Ridge and Aurora reporting similar, serious losses. Colorado Springs and Greeley have also lost over a hundred large spruce trees to this beetle. If the drought continues, this Ips problem could become a major epidemic because spruce is one of the first species affected by water shortages.

South Dakota

The pine engraver, *Ips pini*, is another bark beetle causing significant amounts of ponderosa pine mortality in the Black Hills. Pine engraver populations built up in storm and fire damaged areas and then increased exponentially around the Black Hills for the last 3 years, no doubt aided by drought conditions.

Many of the areas getting hit hardest by Ips in the Black Hills are in the wildland-urban interface. In 2002, the pine engraver affected approximately 25,000 acres of private and urban forest lands. The population has been increasing in recent years due to the increase in suitable host material, trees that have been injured or killed by fire and severe snow and hail storms.

The recent, unprecedented levels of Ips activity are a consequence of wildfires and weather events, such as hail and snow-breakage. Ips beetles breed in this weakened and damaged tree material. With a nearly unlimited supply of food, the Ips beetle populations increased significantly. Now that this food supply is becoming less suitable, Ips have exited it and are killing standing trees.

Nebraska

Ips populations moved into jack pine stands that had been defoliated by jack pine budworm on the Halsey unit of the Nebraska National Forest. In severely defoliated areas, up to 25% of the trees had Ips attacks. In the Pine Ridge area, there was light and scattered mortality caused by Ips. If drought conditions continue, Ips populations will likely increase.

Douglas-fir beetle, *Dendroctonus pseudotsugae*, attacks Douglas-fir in Colorado and Wyoming forests. Listed below are current places with Douglas-fir beetle outbreaks/epidemics in these states.

Colorado

Douglas-fir beetle activity was low along the Front Range of Colorado and in the areas of the previous outbreaks associated with the 1996 Buffalo Creek wildfire and the 1993-1995 Douglas-fir tussock moth defoliation. Forest Health workers anticipate increases of Douglas-fir beetle activity in 2003 in many areas of the Arapaho-Roosevelt, Pike-San Isabel, San Juan, and White River National Forests from the 2002 wildfires that burned in Douglas-fir forest type.

Douglas-fir beetle continues to kill mature trees in areas scattered throughout southern Colorado. One area of note is north of Durango where several hundred trees have been killed. In many cases, Douglas fir beetle activity is occurring in areas of chronic defoliation by western spruce budworm (Choristaneura occidentalis). A prime example of this activity is in the Wolf Creek Pass

area. In southern Colorado Douglas-fir beetle has been noted on virtually every forest, but there is little evidence of a major outbreak of the insect.

Wyoming

Douglas-fir beetle is causing extensive damage in Wyoming forests. Douglas-fir beetle infestations frequently result from disturbance events that create large volumes of weakened Douglas-fir trees near susceptible stands. In 1988, extensive wildfires occurred in Yellowstone National Park and the Shoshone National Forest. Populations of Douglas-fir beetle increased in the fire-scorched trees. Subsequent generations of the beetles moved from these injured trees to undamaged trees in nearby forest stands. In 2002, beetle activity from this ongoing epidemic was focused in the North Fork of the Shoshone River drainage west of ody, resulting in at least 80,000 newly faded trees.

Significant Douglas-fir mortality is occurring throughout river corridors in western Wyoming. There was an increase in Douglas-fir beetle activity during 2002 with over 11,000 trees killed along the Snake River and Greys River on the Bridger-Teton National Forest. Significant mortality is also occurring throughout the North and South Forks of the Shoshone River. Impacts are being felt as trees die in campgrounds and around summer cabins and resorts and these scenic corridors are impacted. There is also a growing concern over fire hazard with the accumulation of dead trees in these areas. Douglas-fir beetle is also on the increase on the southern end of the Shoshone National Forest near Dubois. In all of these areas, the beetle populations are expected to rise and cause even more mortality in the coming year. Suppression and control efforts to minimize impacts to these high value recreation areas are ongoing on both the Shoshone and Bridger-Teton National Forests. Significant success in protecting high-value areas has been achieved using the antiaggregant pheromone MCH on the Shoshone National Forest.

The west and east fronts of the Bighorn Mountains are experiencing outbreaks of Douglas-fir beetle. On the west side populations have significantly increased in both Shell and Tensleep Canyons. Additional beetle-caused tree mortality is expected in these areas in 2003.

Douglas-fir pole beetle

Pseudohylesinus nebulosus is rarely considered a major pest species, but this insect has killed many hundreds of mature Douglas-fir in the eastern portion of the San Juan Nation Forest. Undoubtedly drought conditions have allowed this beetle to take advantage of large numbers of susceptible hosts. As the common name indicates, this insect most frequntly attacks smaller diameter Douglas-fir, but trees up to 12 inches DBH are being killed near Pagosa Springs.

Western pine beetle

Western pine beetle (Dendroctonus brevicomis) has been observed killing large ponderosa pine in several locations on the San Juan National Forest. Most frequently found in combination ("mixed broods") with Ips pini (pine engraver) and Dendroctonus adjunctus (the round headed pine beetle), these beetles have killed several hundred large mature ponderosa pine.

Defoliators

Western spruce budworm activity has declined throughout much of the Rocky Mountain Region. There is activity in some areas, one notable example being the Engelmann spruce of the Uncompahgre Plateau in Colorado. Although not large in scale this activity has lingered on for a number of years and is notable because the secondary host, spruce, has maintained this population.

There are several areas where Douglas-fir tussok moth is active. There is a small outbreak south of the Wet Mountains in southern Colorado, and several urban areas in the Front Range have sporadic problems with ornamental spruce being top-killed.

There were e number of tent caterpillar populations causing noticeable defoliation of aspen stands througout the Region. So far this activity has resulted in little if any tree death, but these outbreaks continue to be monitored.

Southwest Region – Region 3 (Arizona)

Joel McMillin

Aerial detection surveys found that more than 17 million ponderosa pine were killed on 600,000+ acres between 2001 and 2003. These are the highest levels of ponderosa pine mortality to be observed in Arizona. The primary causes of this landscape level mortality are severe drought and high stand density leading extensive areas of forest susceptible to bark beetle attack. A complex of bark beetles is killing these ponderosa pine; however, the majority of ponderosa pine attacks in 2001 and 2002 were initiated by *Ips pini* and *I. lecontei*, while *Dendroctonus* species such as *D. brevicomis* play more of a secondary role. Similar landscape level effects are occurring in piñon pine-juniper woodlands with more than 22 million piñon killed by the combination of drought and *Ips confusus* during 2002 and 2003. Mortality levels of piñon have exceeded 95% in stands of piñon–juniper near Flagstaff. While not detected through aerial detection surveys, juniper and cypress bark beetle (*Phloeosinus* spp.) activity was observed from the ground throughout Arizona. In particular, significant cypress bark beetle-caused mortality of native grown Arizona cypress and planted Leyland cypress occurred throughout the Verde Valley and in Southeastern Arizona. Large-scale mortality of aspen is occurring throughout northern Arizona since a June frost event occurred in 1999 followed by several years of drought. More than 70,000 acres of aspen defoliation was observed in 2003. Forest Health Monitoring Evaluation Monitoring funded projects are underway to document stand level impacts in ponderosa pine, piñon pine-juniper woodlands, and aspen ecosystems throughout Arizona.

Southwest Region – Region 3 (New Mexico)
Debra Allen-Reid

A drought-driven outbreak of *Ips confusus*, the piñon ips engraver, is causing significant mortality of piñon, *Pinus edulis,* mostly where piñon grows in association with juniper. Special aerial surveys undertaken as part of a piñon mortality assessment revealed an affected area of 770,000 acres out of the 6.4 million acres surveyed. Estimates by aerial observers indicate some 45 million piñon trees have been killed. More than 90% of the affected area is in northern New Mexico. Localized ponderosa pine mortality from *Ips* and *Dendroctonus* bark beetles was also observed, but statewide, ponderosa mortality for 2003 is below that of 2002. Western spruce budworm activity has also declined since 2002. An *Ips confusus* monitoring program using pheromone-baited Lindgren funnel traps in 5 locations across the state showed only 2 flights in northern New Mexico and 3 in southern New Mexico between March and October of 2003.

Bark Beetle Outbreaks
Infestaciones de los Descortezadores
- due to drought and overstocking
- por sequía y densidad alta forestal

Affected Hosts and Causal Agents
Especies de Árboles Más Afectados y los Insectos Que Causan el Daño
- ***Pinus edulis***:
  Ips confusus

- ***Pinus ponderosa***:
  Dendroctonus brevicomis
  Ips calligraphus
  Ips pini

The greatest damage is being caused by the piñón ips engraver, *Ips confusus*
El daño más grave viene del *Ips confusus*

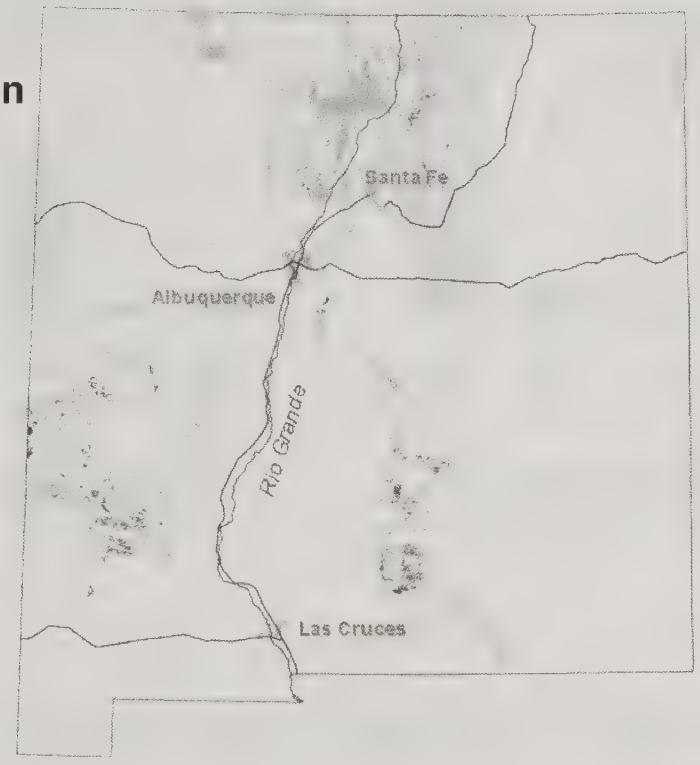
2003 Piñón Mortality Survey
Reconocimiento 2003 de la Mortalidad del Árboles Piñones:

- 6.4 million acres aerially surveyed
  (2.6 millones ha reconocidas por avión)
- 770,800 acres mapped (312,000 ha afectados)
- 45 million dead trees (árboles muertos)

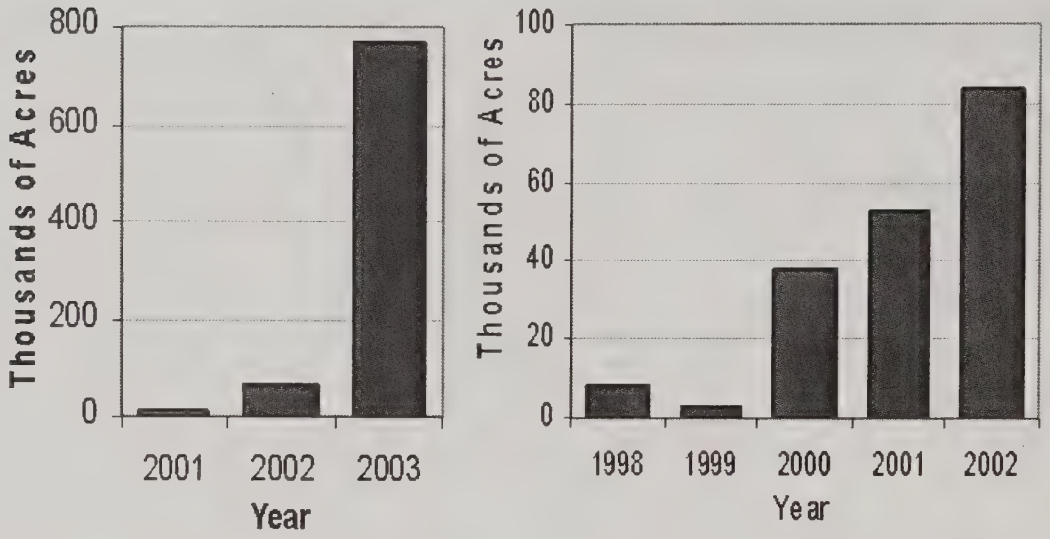
Pine Mortality in New Mexico 2001 - 2003

Pinus edulis
2001-2003:
816,000 ac
(330,000 ha)

Pinus ponderosa
2001-2002:
135,000 ac
(55,000 ha)



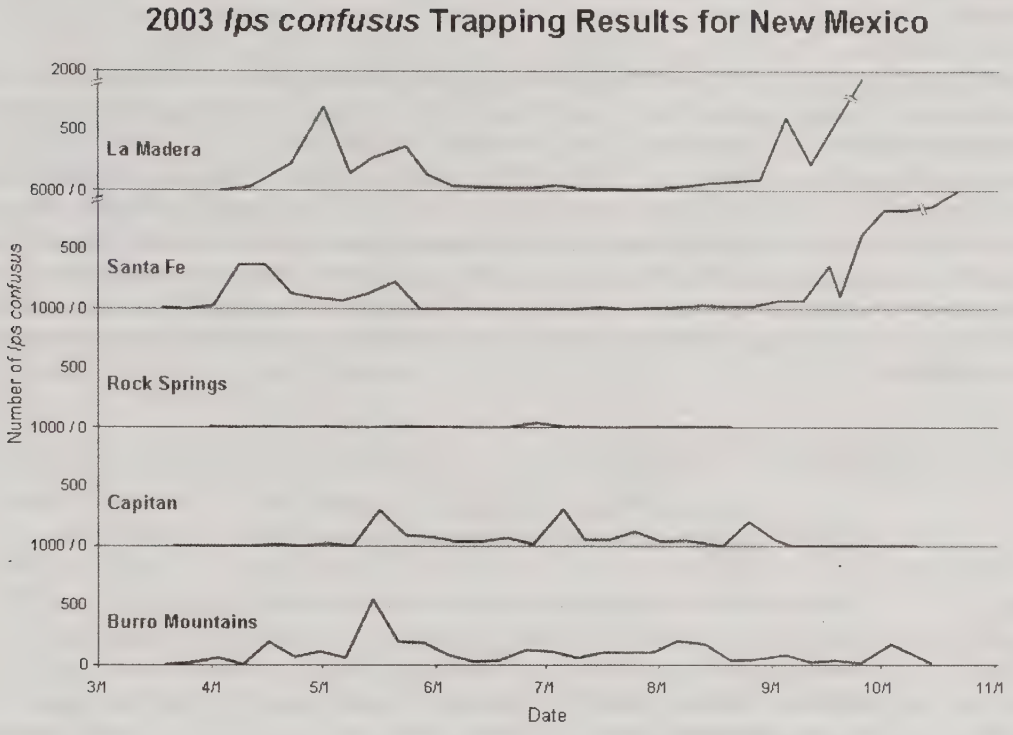
Area Affected by Bark Beetles in New Mexico



Pinus edulis *Pinus ponderosa*

Monitor Trapping for *Ips confusus*

- Lingren funnel traps
- 5 sites, 3 traps per site
- Began in mid-March, still continuing
- 3-component pheromone lure:
  - Ipsdienol (+50/-50)
  - Cis-verbenol (+17/-83)
  - Ipsenol (+50/-50)
- *Ips cribricollis* also responded to this lure



Intermountain Region - Region 4
Karl Jorgensen

Region 4 covers several states: Nevada, Utah, small portion of California, Idaho south of the Salmon River, and western Wyoming. There are two FHP field offices, Boise and Ogden, which service 16 National Forests and other federal lands.

Mountain pine beetle activity increased region wide. Hotspots include the Sawtooth National Recreation Area, Salmon-Challis, Bridger-Teton, Wasatch-Cache and Unita NF's. Most of the MPB activity was in lodgepole pine, but in some areas a number of ponderosa and white pines were being killed.

Western pine beetle, pine engraver beetle, pinyon Ips, Douglas-fir beetle, and fir engraver beetle caused above "normal" mortality, due to continued drought conditions across region 4 in 2003. If the drought conditions persist, mortality from these insects will increase. Western pine beetle activity has increased recently in relation to the drought conditions, especially on the Boise and Payette NF's. Pine engraver beetle activity remained relatively low across the region with some increasing activity on the Boise NF associated with the drought and continued thinning operations. Mortality rates from pinyon Ips ranged from moderate to severe across Nevada and Utah. Nine million acres were flown as part of a national effort to document the extent of the pinyon mortality in the western United States. All forests had some level of Douglas-fir beetle due to the drought conditions. The two largest DFB infestations were on the Targhee and Bridger-Teton NF's with new outbreaks on the Wasatch-Cache NF. Fir engraver beetle activity increased on the Boise, Payette, Manti LaSal, and Humboldt-Toiyabe NF's.

Douglas-fir tussock moth returned to endemic, chronic population levels.

Western spruce budworm activity increased on the Targhee, Boise, Dixie and Fishlake NF's.

Western balsam bark beetle, associated with subalpine fir decline, increased slightly from 2001 but was considerably less than the peak mortality during the mid-1990's.

Spruce beetle activity decreased across the Region from previous years, but there are still large infestations in southern Utah. Fishlake NF was the only NF with increasing activity.

There were no gypsy moths trapped. Other insect projects include the biocontrol of noxious weeds, such as leafy spurge, spotted knapweed, rush skeleton weed and dalmatian toadflax.

The balsam wooly adelgid has been reported in McCall, ID and is expected to be at very low levels on the Payette NF.

Western pine beetle, pine engraver beetle, pinyon Ips, Douglas-fir beetle, and fir engraver beetle caused above "normal" mortality, due to continued drought conditions across Region 4 in 2003. If the drought conditions persist, mortality from these insects will increase.

Mountain pine beetle and western spruce budworm activity increased. Douglas-fir tussock moth returned to endemic levels. Spruce beetle activity decreased across the region, except on the Fishlake NF where it increased. Western balsam bark beetle, associated with subalpine fir decline increased slightly but was considerably less than the peak mortality during the mid-1990's. There were no gypsy moths trapped and other insect projects include the biocontrol of noxious weeds. The balsam wooly adelgid had been reported in McCall, ID and was expected to be at very low levels on the Payette NF.

Pacific Southwest Region - Region 5

Sheri Smith, John Dale, Jeff Mai, & Daniel Cluck

Aerial survey

The annual aerial detection surveys have just been completed for 2003. Approximately 28,000,000 acres were flown with increased levels of mortality observed for southern forests. Drought and insect-induced mortality remains active this year for the hard-hit San Bernardino N.F. and has notably increased in other areas such as Palomar and the Laguna Mts. on the Cleveland N.F. and nearby Santa Ysabel and Los Coyotes Indian Reservations, the Piute Mts. and Breckenridge areas of the Sequoia N.F., as well as scattered areas on the Angeles N.F. Due to the rapid onset of tree mortality and interest from various agency/public entities, the San Bernardino N.F. was surveyed three times during 2003. Approximately 68% of the land base within the administrative boundary is currently affected, increasing from the 44% observed last April.

Surveys for pinyon pine mortality covering approximately 7,500,000 acres were also conducted in California, with coverage expanding slightly into Nevada. Both old and recent mortality was observed in nearly all areas surveyed. Generally, the highest levels of pinyon pine mortality (averaging approximately 25%) were observed along the Hwy 395 corridor from Carson City to Bridgeport.

Bark and Engraver Beetles

Conifer mortality in Southern California continued at unprecedented levels due to drought, overstocking in some cases, and *Dendroctonus brevicomis, D. ponderosae, D. jeffreyi, Melanophila californica, Ips confusus, I. paraconfusus, and I. pini.* Activity of bark beetles throughout the rest of the state was variable, but reports generally indicated a slight upward trend in 2003 with the exception of Jeffrey pine beetle. Mountain and western pine beetle were widely reported, but activity by Jeffrey pine beetle was about at 2002 levels in northeastern California and generally down in the central and southern portions of the Sierra Nevada. The fir engraver caused increasing levels of white fir mortality throughout much of the state. Pine engravers were not widely reported, but activity was described as somewhat increased in the east-central and southern Sierra Nevada. The red turpentine beetle was present at rates that could be described as light to moderate.

Defoliators and Others

The lodgepole needleminer outbreak in Yosemite National Park continued at moderate to high levels. The outbreak of pandora moth on the Inyo National Forest also continued and moderate to heavy defoliation is expected in the spring and early summer of 2004. Trap catches of the European gypsy moth remained low. However, the first capture of an Asian gypsy moth in California was recorded in Los Angeles in July 2003. Trap density was increased in a nine-mile area around the find.

Pacific Northwest Region- Region 6

Iral Ragenovich

Drought and overstocking continued to be the primary underlying reasons for increased bark beetle activity in Washington and Oregon. Douglas-fir beetle populations in NE WA and OR and spruce beetle on the Okanogan NF are declining. Mountain pine beetle and western pine beetle have increase significantly. Acres with mountain pine beetle mortality increased from under 200,000 acres in 2001 to just less than 400,000 acres in 2003. In years of drought and high stress, western pine beetle often replaces mountain pine beetle in ponderosa pine; acres with western pine beetle mortality increased from about 35,000 acres in 2002 to almost 130,000 acres in 2003.

The Douglas-fir tussock moth populations collapsed in the region - almost all populations had declined to endemic levels by 2002. Early Warning Trap counts show slightly higher population levels on the Fremont and Winema NF's in south central Oregon. Total acres of defoliation for western spruce budworm increased to 146,000 in 2003 from about 40,000 in 2002. WSBW decreased on the Yakama IR and has been increasing to the north and northeast near Rimrock and the southern part of the Wenatchee NF. An associated budworm complex (wsbw, black-headed budworm, etc.) defoliation occurred in several small areas in northeastern Idaho and the Idaho panhandle. There is modoc budworm in southern OR.

Acres of balsam woolly adelgid have increased significantly in the last three year, and a gypsy moth eradication project was conducted on 702 acres on the Siuslaw NF and adjacent private lands. The introduction was a result of move-ins from the east coast.

PEST INCIDENCE REPORT, 2003 – ALBERTA
Compiled by Sunil K. Ranasinghe

The spruce budworm, *Choristoneura fumiferana* (Clemens), infestation continued in Alberta in 2003. The budworm defoliation in the inventoried area slightly decreased from an estimated 159 456 ha in 2002 to 124 815 ha in 2003; in the non-inventoried area, it increased from 23 658 ha in 2002 to 33 443 ha in 2003. This insect also defoliated an extensive area in Wood Buffalo National Park. Risk of new spruce budworm outbreaks occurring in 2004 is low in most of the forested areas in the province.

Seventeen red-attacked trees symptomatic of the mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins, were detected during aerial surveys over forested Crown land in 2003. In addition, an estimated 4880 red-attacked trees were found in Banff National Park, 12 were found in Jasper National Park and 10 were found in Willmore Wilderness Park. During 2002/2003, the number of green attack trees in Banff National Park was estimated at 6950. During ground surveys green attack trees were detected in the Bow Valley in forested Crown land (1029), in the Town of Canmore (303) and in Willmore Wilderness Park (113). Many plots with pheromone-baited trees in southern Alberta and two in Willmore Wilderness Park had MPB hits. A new plot located at Kakwa Wildland Provincial Park had the northernmost MPB hits on baited trees.

The MPB management program in 2002/2003 composed of prevention by restricting log movements and direct control by cut and burn of green attack trees. Nearly 98% of the 1029 green attack trees in the forested Crown land were removed under this program. In addition, green attack trees were removed in Canmore (303) and in Willmore Wilderness Park (113). An estimated 2725 green attack trees were removed when 4420 ha of beetle susceptible trees were burned at Banff National Park. As well, 524 trees were baited with pheromones to contain the MPB.

The large aspen tortrix (LAT), *C. conflictana* (Walker), was the predominant aspen leaf defoliator in the province in 2003. This defoliation moved eastwards and was scattered over an estimated 5.4 million ha. Forest tent caterpillar, M*alacosoma disstria* Hübner, was patchy and indistinguishable from LAT defoliation in most cases. Aspen two-leaf tier, *Enargia decolor* (Wlaker), moths were common in many pheromone traps set up in northeast Alberta. Three male gypsy moths, *Lymantria dispar* (Linnaeus), were caught in two baited-traps set up in Edmonton.

More, smaller European elm bark beetles, *Scolytus multistriatus* (Marsham), were trapped but there were no cases of Dutch elm disease in Alberta. However, a similar vascular disease caused by *Dothiorella ulmi* affected many trees in Edmonton.

Among the other noteworthy diseases in 2003 were: Yellowheaded spruce sawfly, *Pikonema alaskensis* (Rohwer), ash leaf cone caterpillar, *Caloptiia fraxinella* (Ely) and the red elm weevil, *Magdalis armicollis* (Say). The City of Edmonton lost nearly 4000 black ash trees due 2003 drought.

FOREST PESTS CONDITION IN MEXICO
Compiled by Jaime Villa Castillo

Bark beetles on the genus *Dendroctonus* is the most common pest in native forest of Mexico. Other bark beetles on the genus *Ips* and *Scolytus* occasionally do outbreak causing considerable local damage.

During 2002 and early 2003 bark beetles *Dendroctonus mexicanus* and *Dendroctonus frontalis* affected conifer forests at what is considered normal historic rate in southern states and in central Mexico. Roundheaded pine beetle *Dendroctonus adjunctus* was affecting high elevation pine forest in central Mexico as usual, but abnormal high activity was reported in the south (Oaxaca) and in the north (Chihuahua).

Unusual record of tree mortality was recorded for Douglass-fir beetle *Dendroctonus pseudotsugae* and *Ips* bark beetles in northern states. The first one affected unmanaged stands of *Pseudotsuga flahauti* in Durango State and Chihuahua. The later one was particularly aggressive in high sierras of Baja California after a historic record of severe drougth. *Ips pini* affected the already reduced Jeffrey pine tree population in sierra de Juarez and *Ips confusus* affected pinyon pine forest.

The exotic red gum lerp psylid, *Glycaspis brimblecombei*, invaded in less than a year, most *Eucalyptus camaldulensis* urban and plantations trees in central and northern Mexico, after first being discovered in the northern border city Tijuana in year 2000. After a massive invasion and tree damage for up to 40% in urban and rural plantations current population level is going down, probably due to a successfully established biological control program with the parasitoid wasp *Psyllaephagus bliteus*.

CONDICIÓN DE INSECTOS FORESTALES EN MÉXICO

Los descortezadores del género *Dendroctonus* son la principal plaga forestal de México. Otros descortezadores son los géneros *Ips y Scolytus* ocasionalmente causan daños de magnitud local. Durante el año 2002 y principios de 2003 los descortezador *Dendroctonus mexicanus* y *Dendroctonus frontalis* afectaron bosques de coníferas del sur y del centro de México, en una tasa considerada como normal, de acuerdo con los registros históricos. El descortezador *Dendroctonus adjunctus* afectó los bosques de pino de alturas en una tasa normal en el centro del país, pero se reportaron daños mayores a los normales en Oaxaca y Chihuahua. Los descortezadores *Dendroctonus pseudotsugae* e *Ips* causaron daños importantes en estados del norte de México. En particular, *D. pseudotsugae* afectó sitios *de Pseudotsuga flahauti* que habían permanecido sin manejo en Durango y Chihuahua. Por su parte, los descortezadores del género *Ips* fueron particularmente agresivos en las sierras altas de Baja California, después de una extrema sequía. El descortezador *Ips pini* afectó los ya de por si reducidos bosques de *Pinus Jeffrey*, mientras que *Ips confusus* afectó el bosque de pino piñonero. El Psílido del eucalipto *Glycaspis brimblecombei*, invadió en menos de un año, la mayoría de los árboles de *Eucalyptus camaldulensis* en áreas urbanas y plantaciones rurales del centro y norte de México. Después de esa invasión masiva con un daño de hasta el 40% en áreas urbanas y plantaciones rurales, la población actual va a la baja, debido probablemente al éxito del control biológico establecido con la avispa parasitoide *Psyllaephagus bliteus*.

POSTER TITLES AND AUTHORS
TITULOS Y AUTORES DE LOS CARTELES

1E Pests and diseases in teak (*Tectona grandis* L.f.) in Central America
1S Plagas y parásitos de teka (Tectona grandis L.f.) en América Central

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Pests and diseases in teak (*Tectona grandis* L.f.) in Central America

Teak (*Tectona grandis* L.f.) is one of the main species used for reforestation in tropical regions. Currently there are 40000 ha reforested with this species in Costa Rica. During the last eigtht years, commercial plantations of *T. grandis* in the Huetar Norte, Huetar Atlántica and Chorotega regions of Costa Rica have been inspected in order to diagnose for herbivores and phytopathogens. 20 species of insects (48%), 18 species of pathogens, two species of vertebrates and one species of mistletoe (Lorathaceae Family) were identified. Problems with major impact on buds are produced by *Phomopsis* sp.; on foliage by *Pseudoepicocus* sp. (spots) and the defoliating insect *Hyblaea puera* (Hyblaeidae, Lepidoptera) and *Rhapdopterus* sp. (Crhysomelidae, Coleoptera). Damages to tree trunks produced by the bacterium *Agrobacterium tumefaciens* and various cankers of fungoid origin (*Nectria nauriticola*, *Fusarium* sp. and *Botryodiplodia* sp.), as well as the borers *Plagiohammus spenipennis* and *Neoclytus cacicus* (Cerambycidae, Coleoptera) are described.

Plagas y parásitos de teka (*Tectona grandis* L.f.) en América Central

La teca (*Tectona grandis* L.f.) es una de las especies mayormente usadas en reforestación en las regiones tropicales. Actualmente existen 40000 ha reforestadas con esta especie en Costa Rica. Durante los últimos ocho años, plantaciones comerciales de *T. grandis* en las regiones Huetar Norte, Huetar Atlántica y Chorotega de Costa Rica han sido inspeccionadas para la determinación de herbívoros y fitopatógenos asociados a la especie. 20 especies de insectos (48%), 18 especies de patógenos, dos especies de vertebrados y un muérdago (Familia Lorathaceae) fueron identificados. Los problemas de mayor impacto en brotes son producidos por *Phomopsis* sp.; en follaje por *Pseudoepicocus* sp. (manchas) y el esqueletizador *Hyblaea puera* (Hyblaeidae, Lepidoptera) y *Rhapdopterus* sp. (Crhysomelidae, Coleoptera). En el fuste, los daños producidos por la bacteria *Agrobacterium tumefaciens* y varios cancros de origen fúngico (*Nectria nauriticola*, *Fusarium* sp. and *Botryodiplodia* sp.), así como los barrenadores *Plagiohammus spenipennis* y *Neoclytus cacicus* (Cerambycidae, Coleoptera) son descritos.

2E Southern Pine Beetle Prevention Using Hazard Rating, Forest Management, and Cost Share Incentives
2S Prevención de plagas del gorgojo descortezador de pino aprovechando sistemas de riesgo, manejo forestal e incentivos

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Southern pine beetle prevention using hazard rating, forest management, and cost share incentives

The southern pine beetle (SPB), *Dendroctonus frontalis*, is the most destructive pest of pines in the southern U.S. and Central America. SPB outbreaks are cyclic, with peaks occurring every 6-10 years. Overly-dense, unmanaged stands of loblolly pine(*Pinus taeda*) are most prone to SPB attacks and are the target of prevention programs in East Texas. The Texas Forest Service (TFS) has developed a system for hazard rating large areas (18,000 acre grid blocks) for SPB susceptibility, based on the distribution and abundance of dense pine stands on the landscape. Particularly within grid blocks rated as moderate, high, or extreme hazard, TFS is encouraging private forest landowners to take preventive measures by offering federal cost shares for first thinnings of high hazard pine stands. The overall goal is to identify beetle-prone areas within East Texas and reduce their susceptibility through forest management and cost-share incentives, prior to the next SPB outbreak.

Prevención de plagas del gorgojo descortezador de pino aprovechando sistemas de riesgo, manejo forestal e incentivos

El gorgojo descortezador de pino, *Dendroctonus frontalis*, es la peste más destructiva de los pinares en la región sur de los EE.UU. y en Centroamérica. Las plagas de este gorgojo son cíclicas; por lo general ocurren cada 6-10 años. En Texas, los rodales muy densos de *Pinus taeda* son los más susceptibles y los que reciben prioridad para programas de prevención. El Servicio Forestal de Texas (SFT) ha desarrollado un sistema para medir el riesgo de plagas sobre áreas grandes (bloques de 7,300 ha. cada uno), basado en la distribución y abundancia de rodales densos de pino. El SFT está ofreciendo incentivos monetarios a los dueños para ralear sus rodales densos. Reciben incentivos solamente si los rodales son de mediano o alto riesgo al gorgojo basado en la densidad y edad del rodal, entre otros factores. La meta principal es identificar las áreas de alto riesgo al gorgojo y reducir su susceptibilidad a través de manejo forestal e incentivos, antes de que aparezca la próxima plaga de *Dendroctonus frontalis*.

3_E Forecasting southern pine beetle infestation trends with pheromone traps
3_S Pronóstico de tendencias de *Dendroctonus frontalis* por el uso de trampas con feromonas

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Forecasting southern pine beetle infestation trends with pheromone traps

The southern pine beetle, *Dendroctonus frontalis*, is the most destructive pest of pines in the southern U. S. In Texas, SPB has 7 generations per year and outbreaks are cyclic, with peaks occurring every 6-10 years. The Texas Forest Service has developed a practical system for predicting SPB infestation trends (increasing, static, declining) and levels (high, moderate, low) for the current year that uses pheromone-baited traps. The system is now in use operationally in 15 southern and northeastern states. A comparison of annual predictions with actual SPB detection records for the period 1987-2002 showed that prediction accuracy at the state level averaged 71-72%, but varied among states from 50% - 87% for SPB trend and 50% - 94% for SPB level.

Pronóstico de tendencias de *Dendroctonus frontalis* por el uso de trampas con feromonas

El gorgojo descortezador de pino, *Dendroctonus frontalis*, es la peste más destructiva de los pinares en el sur de los Estados Unidos y en Centroamérica. El Servicio Forestal de Texas ha desarrollado un sistema práctico para pronosticar la tendencia de la plaga (si esta aumentando, bajando o esta estática) y su nivel (alto, mediano o bajo) para el presente año utilizando trampas de feromonas. Desde 1986, se ha usado el sistema de pronóstico en todos los estados del sur de los EE.UU. Se colocan tres trampas con el atrayente "frontalin" y trementina de pino (agarraz) en la primavera en cada condado o distrito forestal. Los insectos captados se recogen semanalmente por cuatro semanas. Para hacer el pronóstico, se usan el número promedio de gorgojos captados por trampa por día y la abundancia de los gorgojos en comparación a la abundancia de los cléridos (*Thanasimus dubius)*, un depredador común del gorgojo. La precisión de los pronósticos de la tendencia de plagas desde 1987 ha sido de promedio de 71% (50%-87%) y la de nivel de promedio de 72% (50-94%).

4_E Platypodidae and Scolytidae (Coleoptera) from the Sierra de Huautla Biosphere Reserve, Morelos, Mexico
4_S Platypodidae y Scolytidae (Coleoptera) de la Reserva de la Biosfera Sierra de Huautla, Morelos, México

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Platypodidae and Scolytidae (Coleoptera) from the Sierra de Huautla Biosphere Reserve, Morelos, México

The Platypodidae and Scolytidae families of coleoptera are two of the most important groups in plant ecosystems worldwide, mainly because they are the cause of serious damage in forestry.

However, few is known about the impact of these kind of coleopterans on other plant communities as the deciduous tropical forest located at southern Morelos, part of which lies within the Reserva de la Biosfera Sierra de Huautla. With the purpose of getting more knowledge about these taxa, here several taxonomic and ecological aspects of bark beetles were studied. Systematic collections were performed between 2000-2001. As many as 64 species were collected (within 30 genera), two of them belonging to Platypodidae; the rest were Scolytidae (represented by 61 species). This research updates this group of insects, specially the Scolytidae whose current number is 208 species (three more that those reported to date) among which *Chramesus unicornis*, *Pseudothysanoes graniticus*, *Cactopinus cactophthorus*, *Xyleborus morulus*, and *Hypocryphalus mangiferae* are the most relevant. *H. mangiferae* is recorded for the first time for Morelos. Several morph species that belong to the genera *Cnesinus* (1), *Phloeotribus* (2), *Pseudopityophthorus* (1), *Pityophthorus* (4) and *Corthylus* (2), as well as one genus within the tribe Cryphalini were determined, and all are subjected either to identification or description. *Phloeotribus carinatus* Burgos y Equihua is a new species for bark beetles and it is described here. Dichotomy keys were elaborated to separate the genera reported herein. Also, additional information concerning biology and of the species is included.

Platypodidae y Scolytidae (Coleoptera) de la Reserva de la Biosfera Sierra de Huautla, Morelos, México.

Las familias Platypodidae y Scolytidae constituyen los grupos más importantes en ecosistemas vegetales, sobre todo por ser causa de serios estragos en comunidades forestales. Sin embargo, poco se conoce del impacto que ocasionan estos coleópteros en otros tipos de comunidades vegetales como en la selva baja caducifolia del país y en particular al sur del estado de Morelos, aún más lo son en aquellas zonas sujetas a conservación como la Reserva de la Biosfera Sierra de Huautla (REBIOSH). Con objeto de conocer más acerca de estos taxa, en el presente trabajo se abordaron aspectos faunísticos, taxonómicos y ecológicos de estos escarabajos. Colectas sistemáticas directas e indirectas (trampas-cebo) fueron realizadas en el período 2000-2001, explorando en los diferentes tipos de vegetación del área. Fueron colectadas 64 especies, incluidas en 30 géneros de las dos familias, dos pertenecientes a Platypodidae y el resto a Scolytidae (representada por 61 especies) (Cuadro 1). Esta investigación aporta un registro actualizado de este grupo de insectos, en particular Scolytidae cuyo número actual es de 208 especies (tres más que las reportadas) entre las que destacan *Chramesus unicornis*, *Pseudothysanoes graniticus*, *Cactopinus cactophthorus*, *Xyleborus morulus,* e *Hypocryphalus mangiferae*; esta última se registra por primera vez para el estado a nivel específico y genérico. Se determinaron diez morfoespecies pertenecientes a los géneros *Cnesinus* (1), *Phloeotribus* (2), *Pseudopityophthorus* (1), *Pityophthorus* (4) y *Corthylus* (2), así como un género de la tribu Cryphalini. Actualmente se encuentran en proceso de descripción cuatro especies del género *Pityophthorus* y de publicación a *Phloeotribus carinatus* Burgos y Equihua, la cual constituye una nueva especie para la ciencia.

5E Damage Survey of the Redgum Lerp Psyllid in Mexico City

5S Evaluación de Daños Causados por el Psílido del Eucalipto en la Ciudad de México

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Damage Survey of the Redgum Lerp Psyllid in Mexico City

Eucalyptus trees are often used in urban reforestation, originally from the Australia-Malasia region, it was introduced in Mexico early on the XX century and it is now widely distributed in the country. The most common eucalyptus species in Mexico city are: *Eucalyptus camaldulensis, E. globulus and E. sinerea*, they are heavily infested by the redgum lerp psyllid *Glycaspis rimblecombei* an exotic sucking insect that has quickly dispersed through the country. The objective was to evaluate damage and mortality caused by *G. brimblecombei on Eucalyptus spp.* A damage scale based upon psyllid presence and defoliation was set up, it goes from 0 to 12 points (healthy to dead tree), we conducted a sampling procedure by transects modified from the

centered-point quarter method, at least 20 points/stand were sampled. The evaluation conducted in several areas distributed within the Mexico city metropolitan area indicates that by August 2003 (after al least two years of infestation) almost every eucalyptus tree is infested; however, there is only minor mortality and severely defoliated eucalyptus tend to recover remarkably during the rainy season.

Evaluación de Daños Causados por el Psílido del Eucalipto en la Ciudad de México

Los eucaliptos son árboles muy utilizados en reforestaciones urbanas, originario de la región Australo-Malaya fue introducido en México desde inicios del siglo XX y en la actualidad está ampliamente distribuido en el país. En la Ciudad de México, las especies de eucaliptos más comunes son *Eucalyptus camaldulensis, E. globulus y E. sinerea*, los cuales se han visto severamente infestados por el psílido o conchuela *Glycaspis brimblecombei* un insecto chupador exótico y que se ha dispersado rápidamente en nuestro país. El objetivo fue evaluar los daños y la mortalidad provocada por *G. brimblecombei* sobre *Eucalyptus* spp. Se estableció una escala de daño por presencia y defoliación de 0 a 12 puntos (árbol sano hasta muerto) y se aplicó un muestreo por transectos modificado del método de "cuadrantes con punto central" con un mínimo de 20 puntos por rodal. La evaluación efectuada en áreas arboladas distribuidas en la zona metropolitana de la Ciudad de México muestra que a la fecha (agosto 2003), después de al menos dos años de infestación, casi la totalidad de los eucaliptos están infestados; sin embargo, solo hay una mínima mortalidad y los eucaliptos que muestran una defoliación importante, tienden a recuperarse notablemente durante el periodo de las lluvias.

6$_E$ The potential role of ectomycorrhizal mutualists in determining Douglas-fir resistance to defoliation by the western spruce budworm.

6$_S$ El papel potencial de las ectomicorrizas mutualistas en determinar la resistencia de *Pseudotsuga menziesii* a la defoliación por *Choristoneura occidentalis*

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El papel potencial de las ectomicorrizas mutualistas en determinar la resistencia de *Pseudotsuga menziesii* a la defoliación por *Choristoneura occidentalis*

Douglas-fir seedlings derived from parent trees that are resistant versus susceptible to western spruce budworm defoliation were inoculated with *Laccaria bicolor* ectomycorrhizal fungi or untreated. Inoculated resistant seedlings had more infested root tips than susceptible seedlings. *L. bicolor* increased foliar concentrations of phosphorus and magnesium in resistant seedlings, and it increased the growth rate of susceptible seedlings. These divergent responses to *L. bicolor* treatment suggest that ecotmycorrhizae might play a role in Douglas-fir resistance to damage from the budworm.

El papel potencial de las ectomicorrizas mutualistas en determinar la resistencia de *Pseudotsuga menziesii* a la defoliación por *Choristoneura occidentalis*

Douglas-abeto planta de semillera derivada de árboles padre que son resistentes contra el deshoje de Picea occidental del gusano de yema, fueron inoculados con el hongo *Laccaria bicolor* una ectomicorriza o sin tratamiento. Inoculamos semillas resistentes que tenían infestadas las extremidades de la raíz, que plantas de semillero susceptibles. *L. bicolor* incremento la concentración foliar de fósforo y magnesio en plantas de semillas resistentes y aumentaron el índice de crecimiento de plantas de semillas susceptibles. Estas respuestas divergentes al tratamiento con *L. bicolor* sugieren que los ectomicorrizas pudieran desempeñar un papel en resistencia del Douglas-abeto al daño del gusano de yema.

7E Disease diagnosis in "Primavera", *Tabebuia donnell-smithii*, in Soconusco, Chiapas

7S Diagnóstico de enfermedades en primavera (*Tabebuia donnell-smithii*) en el Soconusco, Chiapas

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Disease diagnosis in "Primavera", *Tabebuia donnell-smithii*, in Soconusco, Chiapas

Tree plantations are an alternative for rural development. The Soconusco Region in Chiapas State considers "Primavera", *Tabebuia donnell* Smithii, a native timber wood, and a well-paid commodity. However, diseases heavily affect productivity in this species and information about them is very scarce. A disease diagnosis on Primavera, at several different development stages, was performed. The most important diseases found in this study were a leaf blight (A*lternaria* sp.) and a rust (*Prosporium*). The former causes a partial defoliation of plants and when moisture is high the blight covers the entire leaft. The rust kills shoot re-grow and seedling blight, and also promotes deformation, swelling and longitudinal lesions in leaf nerves and stalks. This rust was also faound in plantations, showing similar symptoms as the seedlings, but also provoked cankers in branches and boles. Dieback, promoted by *Botryodiplodia* sp., in branches and boles was found also in plantations, caused leaf yellowing, branch defoliation, and even tree death.

Diagnóstico de enfermedades en primavera (*Tabebuia donnell-smithii*) en el Soconusco, Chiapas

Los árboles forestales se han convertido en una alternativa para el desarrollo rural. La región del Soconusco, Chiapas sigue esta tendencia y considera a la especie maderable "Primavera" como potencial por ser nativa y de madera bien cotizada. Sin embargo, la productividad de esta especie es fuertemente afectada por enfermedades y la literatura sobre este aspecto es muy escasa. Por lo anterior, se considero importante hacer un diagnóstico de enfermedades en Primavera en sus diferentes etapas de desarrollo. Las enfermedades de importancia encontradas fueron manchado foliar (*Alternaria* sp.) y Roya (*Prospodium* sp.). La primera causa una defoliación parcial de la planta y cuando la humedad relativa es alta provoca atizonamiento total. La Roya ocaciona muerte de los rebrotes y atizonamiento de las plántulas, asimismo provoca deformación, hinchamiento y rajaduras en nervaduras y peciolos de las hojas. Esta última enfermedad también fue diagnosticada en plantaciones, presentando síntomas similares a los de plántulas, además ocacionó el desarrollo de cánceres en ramas y fuste de los árboles. En plantación también se diagnóstico muerte regresiva (*Botryodiplodia* sp.) en ramas y fuste, la cual provoca amarillamiento de las hojas y defoliación, incluso llega a ocacionar la muerte del árbol.

8E www.invasive.org: Linking images, information and web-based technologies

8S www.invasive.org: Conectando imágenes, información y tecnologías basadas en la red informática

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www.invasive.org: Linking images, information and web-based technologies

Proper identification of invasive species and associated organisms are important for adequate monitoring and detection activities, as well as to support proper management decisions. Invasive.org (www.invasive.org) is a web-accessible archive of high quality images driven by a fully-searchable taxonomic database based upon the ForestryImages (www.forestryimages.org) framework. Images in the system can be downloaded in the desired resolution, format and file size needed by the user and can be used with no royalties and no fees for all educational applications. The system was developed as a portal to high resolution images with links to species-based information. Invasive.org is one of fifteen (15) websites maintained by the Bugwood Network (www.bugwood.org) on a broad range of topics, including invasive species, forestry and forest health, and entomology dealing with both natural systems and more directly managed systems. Invasive.org and the associated ForestryImages system (as of June 2003) make over 15,000 images taken by over 440 photographers on 3,000+ subjects available to users. During the period of Jan. 2002 through April 2003, over 6.5 million pages of information were served to more than 581,000 users through these systems. The content of the systems and the user base continues to expand. We invite you to visit, utilize and contribute to these sites. Invasive.org is a joint project between the University of Georgia, USDA Forest Service and USDA APHIS PPQ.

www.invasive.org: Conectando imágenes, información y tecnologías basadas en la red informática

La identificación correcta de especies invasoras y de los organismos asociados con ellas es importante para el monitoreo adecuado y las actividades de investigación, como también para proveer las decisiones de manejo adecuadas. Invasive.org (www.invasive.org) es un archivo accesible a través de la red informática, de imágenes de alta calidad transmitidas por un banco de datos taxonómicos totalmente informativos basados en el armazón de ForestryImages (www.forestryimages.org). Las imágenes en el sistema pueden ser bajadas en la resolución deseada, en el formato y el tamaño de archivo necesario al usuario, y puede ser usado sin derechos de autor y sin honorarios para todos los usos didácticos. El sistema fue desarrollado como un portal de imágenes de alta resolución con conección basada en la información de especies. Invasive.org es uno de quince (15) sitios de red mantenidos por "La red Bugwood" (www.bugwood.org) en una amplia línea de materias, que incluyen: especies invasoras, silvicultura y sanidad forestal y entomología con referencia a sistemas naturales y sistemas de manejo directo. Invasive.org y el sistema asociado ForestryImages (hasta junio del 2003) tienen más de 15,000 imágenes tomadas por más de 440 fotógrafos en más de 3000 tópicos disponibles para los usuarios. Durante el período de enero del 2002 hasta abril del 2003, más de 6.5 millones de páginas de información fueron entregadas a más de 581,000 usuarios a través de estos sistemas. El contenido de los sistemas y el banco de usuarios continúan expandiéndose. Lo invitamos a usted a que nos visite, que utilice y que contribuya a estos sitios. Invasive.org es un proyecto conjunto entre la Universidad de Georgia, el Servicio Forestal del Departamento de Agricultura de los EEUU y el USDA APHIS PPQ.

9_E Comprehensive Survey of Forest Health in the Spruce-Fir Cover Type in the Telluride Ski Area, Colorado

9_S Un exámen comprensivo de la salud del bosque en el tipo de cuvierta forestal *Picea-Abies*, en el área de esquiar de Telluride, Colorado

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10_E The elm wood borer, *Paranthrene dollii* (Neumoegen) (Lepidoptera: Sesiidae) in Tepeji del Río, Hidalgo, Mexico

10_S El barrenador del álamo, *Paranthrene dollii* (Neumoegen) en Tepeji del Río, Hidalgo, México

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The elm wood borer, *Paranthrene dollii* (Neumoegen) (Lepidoptera: Sesiidae) in Tepeji del Río, Hidalgo, Mexico

The Doll's clearwing moth was introduced into México in 1987 in the state of San Luis Potosi, the current distribution has extended to Oaxaca in the South and to Baja California in the North. It produces severe damages in young trees and those under stress. Th study was done in "La Morena Ranch" located in Tepeji del Río, Hidalgo. The study area was visited twice a month from March to December 2000. The eggs were observed from December 2000 to January 2001, larvae from March to September 2001. By middle September pupae were found and the adult activity was observed from late October to late November. Taking into account the species has only one generation per year. The gallery of the larvae is irregular in shape and it is constructed in the upper side of the hole entrance, in most cases the gallery was associated with fungi.

El barrenador del álamo, *Paranthrene dollii* (Neumoegen) en Tepeji del Río, Hidalgo, México

El barrenador del álamo se introdujo a nuestro país en 1987 en el estado de San Luis Potosí, actualmente su distribución se ha ampliado hasta el estado de Oaxaca en el Sur y al Estado de Baja California en el Norte. Sus daños son severos en arbolado joven y en aquellos individuos estresados por falta de nutrientes, agua y espacio adecuado para su desarrollo. El presente estudio se realizó en el rancho "La Morena" ubicado en la localidad de Tepeji del Río, Hidalgo. Se realizaron visitas de inspección quincenalmente de marzo a diciembre del 2000 al área de estudio. Los huevecillos se observaron de diciembre del 2000 hasta el mes de enero del 2001. Las larvas estuvieron presentes de marzo del 2000 al mes de septiembre. A mediados del mes de septiembre se encontraron algunas pupas. A finales de octubre aparecieron los primeros adultos y los últimos se capturaron a finales del mes de noviembre. De acuerdo con los datos observados se puede inferir que en el área solo se presenta una generación al año. La galería es de forma irregular y generalmente se dirige hacia arriba del tronco o las ramas, en la mayoría de los casos se encontró la presencia del hongo asociado a las galerías del barrenador.

11_E The galling mite of *Salix bomplandiana* in Xochimilco, D.F., Mexico

11_S El acaro agallador del ahuejote (*Salix bomplandiana*) en Xochimilco, D.F.

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The galling mite of *Salix bomplandiana* in Xochimilco, D.F., Mexico

The eriphyoid *Aculops tetanothrix* (Nalepa) produce galls formation to *Salix bonplandiana* foliage in the "Chinampas" zone in Xochimilco, Mexico. This species attacks also some *Salix* species in Europe and North America. The mite is well distributed in the area affecting young and mature trees, principally on young leaves. Galls are round in form the color is green pinkish or reddish. Gravid females generally starts gall formation, on the lower side of the leaf, feeding habits produces tissue deformation, protruding to the upper side of the leaves. Once the gall is form population goes inside. All stages of development can be found inside the pouch. Galls could be counted from few numbers to several dozens per leaf on the upper side. These are located close to central or secondary nerves. Eriophyoids produce the foliage to become old and premature defoliation.

El acaro agallador del ahuejote (*Salix bomplandiana*) en Xochimilco, D.F.

La especie de eriófido *Aculops tetanothrix* (Nalepa) se encuentra dañando al follaje de *Salix bonplandiana* en la zona chinampera de Xochimilco, México. Esta especie se encuentra atacando varias especies de *Salix* tanto en Europa como en Norteamérica. Este ácaro se encuentra ampliamente distribuido en la zona chinampera afectando follaje tanto de arbolado joven como de

árboles viejos, especialmente sobre las hojas jóvenes. Las agallas son redondeadas de coloración verde con zonas rosadas y rojizas. Las hembras grávidas son las que generalmente dan inicio a la formación de las agallas. El ácaro ataca la planta por la parte del envés de las hojas y conforme se alimenta por varios días en la misma zona provoca que el tejido se deforme desarrollándose la agalla, hacia el haz. Una ves que la agalla se forma los organismos penetran, la alimentación del resto de la población presente ayuda también en la formación de la agalla. Dentro de la bolsa se encuentran generalmente todos los estadios de desarrollo. Las agallas van de unas cuantas sobre la superficie de la hoja a varias decenas desarrollándose sobre toda la superficie de la hoja, principalmente cerca de la nervaduras central y secundarias. El daño causado por los eriófidos provoca el envejecimiento prematuro y caída de las hojas.

12_E Monitoring of *Psyllaephagus bliteus*, a parasitoid of the redgum lerp psyllid (*Glycaspis brimblecombei*), in Aguascalientes, Mexico

12_S Monitoreo de *Psyllaephagus bliteus*, Parasitoide del Psílido del Eucalipto (*Glycaspis brimblecombei*), en Auguascalientes, Mexico

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Monitoring of *Psyllaephagus bliteus*, a Parasitoid of the Red Gum Lerp Psyllid (*Glycaspis brimblecombei*), in Aguascalientes, Mexico

On February of 2001, the red gum lerp psyllid (*Glycaspis brimblecombei*) was detected for the first time in Aguascalientes, Mexico. A year later, the National Research Institute on Forestry, Agriculture and Livestock started a research project, which objective was to introduce and evaluate the establishment capacity of *Psyllaephagus bliteus* within this State. The project was to follow the classical biological control strategy of *G. brimblecombei*, started in California, U.S.A, in 1998, and Jalisco and Distrito Federal in 2001. However, on May of 2002, we found out that *P. bliteus* was already self established in several locations in Aguascalientes. Therefore, an artificial introduction of this parasitoid to the State resulted unnecessary. Adjusting the focus of our research, from June to August of 2002, we sampled eucalyptus (*Eucalyptus camaldulensis*) foliage in 28 locations within the State of Aguascalientes and two locations in Zacatecas. The objective was to determine the distribution of *P. bliteus* and its degree of parasitism. We found *Psyllaephagus bliteus* in all the sampled locations. Parasitism on mature nymphs ranged from 5 to 88%. Fifteen sample sites had 27 to 55% parasitism. Out of 3392 analyzed mature nymphs, 1365 were parasited, representing 40% parasitism. Our sample procedure was repeated from January to March, and June to August of 2003, at the same sample sites as in 2002. Results from these sampled periods indicate that *P. bliteus* is already well self established in Aguascalientes.

Monitoreo de *Psyllaephagus bliteus*, Parasitoide del Psílido del Eucalipto (*Glycaspis brimblecombei*), en Aguascalientes, México

En febrero de 2001, el psílido del eucalipto (*Glycaspis brimblecombei*) fue detectado por primera vez en Aguascalientes. Un año después, el Instituto Nacional de Investigaciones Forestales, Agrícolas y Pecuarias inició un proyecto de investigación que pretendía introducir y evaluar la capacidad de establecimiento del parasitoide *Psyllaephagus bliteus* en dicha entidad. El proyecto seguía la estrategia de control biológico clásico de *G. brimblecombei*, iniciado en California, E.U.A. en 1998 y en Jalisco y Distrito Federal en 2001. Sin embargo, en mayo de 2002, los autores del presente descubrieron que *P. bliteus* ya se encontraba auto establecido en varias localidades de Aguascalientes, por lo que la introducción artificial del parasitoide al Estado resultaba innecesaria.

Reorientando el enfoque de nuestro proyecto, durante junio a agosto de 2002, se realizó un muestreo de follaje de *Eucalyptus camaldulensis* en 28 localidades del estado de Aguascalientes y dos en Zacatecas. El objetivo fue conocer la distribución de *P. bliteus* y los niveles de parasitismo alcanzados. Se encontró a *P. bliteus* en todas las localidades muestreadas. El parasitismo en ninfas maduras varió desde 5 hasta 88%. El 50% de las localidades presentó un parasitismo de 27 a 55%. De 3392 ninfas maduras analizadas, 1365 estaban parasitadas, lo que representó el 40% de parasitismo. El muestreo de follaje de *E. camaldulensis* fue repetido de enero a marzo y de

junio a agosto de 2003, en las mismas localidades estudiadas en 2002. Los resultados confirman que *P. bliteus* ya se encuentra bien auto establecido en el estado de Aguascalientes.

13_E Distribution of Forest Insects in relation to ozone contamination
13_S Distribución de insectos forestales con relación a contaminación por Ozono

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14_E Spatial distribution of *Malacosoma incurvum* in Xochimilco
14_S Distribución espacial de *Malacosoma incurvum* en Xochimilco

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Spatial distribution of *Malacosoma incurvum* in Xochimilco

During 2003, in the agricultural zone of San Lorenzo, Xochimilco was done a study in populations of worm (*Malacosoma incurvum*) in willow trees (*Salix bonbplandiana)*. With an aerial photographs (INEGI 2000) was done a digital map using UTM geographic projection for identify the surface damage. The most damage zone was ubicated at south east (49% of sampling) and the least damage was located at northeast (13%). The map included only the information of this stage.

Distribución espacial de *Malacosoma incurvum* en Xochimilco

En el 2003 en la zona chinampera de San Lorenzo en Xochimilco, México, se realizó un estudio en poblaciones de gusano de bolsa *(Malacosoma incurvum*) en árboles de sauce (*Salix bonbplandiana)*. Las chinampas fueron clasificadas por zona para identificar el nivel de daño del arbolado en relación a cada una. Para ello, se elaboró un mapa digital con un fotomontaje de fotografías aéreas de un vuelo bajo de INEGI |(2000) para la estimación del área en el cual se proyectaron los puntos de muestreo en unidades UTM. Se identificaron cuatro niveles de infestación catalogados por el número masas de huevecillos por árbol. La zona mas afectada fue la tres ubicada al sureste del predio con el 49% del total de las masas colectadas. La zona con menor porcentaje de huevecillos fue la uno al noroeste de San Lorenzo con el 13%. El mapa representa la primera etapa en la realización de este proyecto, en el que se incluirán los predios de San Gregorio y San Luis, para la construcción de un modelo digital que contenga la información generada hasta el momento.

15_E Tree size preference and attack position on ponderosa pine for the pine engraver beetle *Ips pini*, in Northern Arizona
15_S Preferencia del tamaño de árbol y altura de ataque del grabador *Ips pini* en el norte de Arizona (USA)

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Tree size preference and attack position on ponderosa pine for the pine engraver beetle *Ips pini*, in Northern Arizona

During 2003, we determined the impact of ponderosa pine tree size on attacks by the engraver pine beetle, *Ips pini*. We also compared *Ips pini* preference for the lower versus the upper bole. In July, we attracted insects to trees with *Ips pini* lures (Ipsdienol -97/+3 plus Lanierone) using 7 to 9 trees in four size classes (10, 23, 35, and 50 cm dbh), and two bole positions (breast height and 10cm stem diameter). We measured the resin flow at both bole-positions, crown fading, number of attacks, and phloem thickness. The pine engraver beetle preferred the upper bole of big trees or small trees, where the bark is thin. We describe the spatial pattern of pine engraver attack and suggest a scenario for thinning treatments.

Preferencia del tamaño de árbol y altura de ataque del grabador *Ips pini* en el norte de Arizona (USA

Durante 2003 determinamos el impacto del tamaño de árboles de pino ponderosa sobre el ataque del escarabajo barrenador, *Ips pini*. También comparamos el nivel de preferencia de *Ips pini* por la parte inferior *vs.* la parte superior del tronco. En Julio, atrajimos insectos hacia los árboles mediante el uso de atrayentes específicos para *Ips pini* (Ipsdienol-97/+3 y Lanierone). Se emplearon de 7 a 9 árboles por cada clase de tamaño (10, 23, 35 y 50 cm. dap) y dos posiciones en el tronco (a la altura del pecho y a la altura a la que el tronco alcanza 10 cm. de diámetro). Otras variables medidas fueron: flujo de resina en ambas posiciones del tronco, descoloramiento de la corona, número de ataques y grosor del floema. El escarabajo barrenador prefirió la parte superior del tronco de árboles ya fueran grandes o pequeños donde la corteza es delgada. Describimos el patrón espacial del ataque del escarabajo barrenador y sugerimos un escenario para tratamientos de raleo.

16$_E$ Phytosanitary Status of Forest Plantations in the Yucatan Peninsula
16$_S$ Situación Fitosanitaria de las Plantaciones Forestales de la Península de Yucatán

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Phytosanitary Status of Forest Plantations in the Yucatan Peninsula

Diseases and pest diagnosis were made in 153 forest plantations of Yucatan Peninsula that represented 25.54% of committed surface (5340 ha) in the program of Forest Sanity 2002 of CONAFOR. Shoot borer of apex (*Hypsipyla grandella* Zeller) and stem borer (*Chrysobothris yucatanensis* Van Dyke) of Meliaceae trees were the principal pest in plantations of cedar and/or mahogany of Yucatan Peninsula. They were detected in every plantation with different level of damage. Quintana Roo was ranking in 7.6 and 6.7% as well as Campeche with 38.40 and 9.82%, and finally Yucatan state with 42.89 and 28.38% for *H. grandella* and *C. yucatanensis*, respectively. Leafminer (*Liriomyza* spp.) and powdery mildew (*Oidium* spp.) were regarded as pest due to damage to Forest trees in association with vegetables crops in Quintana Roo state, besides ants

(*Atta* spp.), crickets and gophers. Diagnosis showed the lack of technical attendance in pest control and management of forest plantations.

Situación Fitosanitaria de las Plantaciones Forestales de la Península de Yucatán

Mediante un diagnóstico fitosanitario en 153 plantaciones forestales de la Península de Yucatán, que representaron el 25.54% de la superficie comprometida (5340 ha) en el programa de Sanidad Forestal 2002 de la CONAFOR, se determino que los barrenadores del ápice (*Hypsipyla grandella* Zeller) y de la base del tallo (*Chrysobothris yucatanensis* Van Dyke) de las meliáceas fueron los principales insectos plaga. Se encontraron en el 100% de las plantaciones de cedro y/o caoba de la Península de Yucatán y su nivel de daño varió considerablemente, tan solo en Quintana Roo se presentaron incidencias de 7.60 y 6.77 %, en Campeche de 38.40 y 9.82 % y en Yucatán de 42.89 y 28.38 % para *H. grandella* y *C. yucatanensis*, respectivamente. Otros organismos considerados como plaga, debido a que causaron daños a las especies forestales, fueron el minador de la hoja (*Liriomyza* spp.) y cenicilla (*Oidium* spp.), principalmente, en Quintana Roo en donde la plantaciones forestales se encontraron en asociación con hortalizas; además de hormiga arriera (*Atta* spp.), grillos y tuzas. El diagnóstico también evidenció la falta de asistencia técnica en el control de plagas y manejo de plantaciones forestales.

17_E Demonstration plots for comparing fuels arrangement associated with management of *Dendroctonus rufipennis* (Kirby)

17_S Parcelas demostrativas para la comparación del acomodo de trozos con relación al manejo de *Dendroctonus rufipennis* (Kirby)

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Demonstration plots for comparing fuels arrangement associated with management of *Dendroctonus rufipennis* (Kirby)

Spruce beetle activity increased dramatically on Intermountain Region National Forests beginning in 1987. Between 1995 and 2001 spruce beetles infested over approximately 200,000 acres of spruce-fir forest resulting the death of over 700,000 trees. The extensive mortality also altered fuel complexes and loads in affected areas. The need arose to impose various density management treatments over large spatial scales to suppress spruce beetle populations and reduce the susceptibility of stands to beetle attack. These treatments, however, also resulted in the production of large quantities of down and dead woody fuels and increased fine fuel loads. As a consequence, the risk of ignition and potential for extreme fire behavior in post-treatment stands could exceed that of beetle-killed stands actually increasing the risk of wildland fire. This situation provided a unique opportunity to establish permanent demonstration plots in treated verses untreated spruce-beetle killed stands to conduct fuel inventories and appraisals for assessing changes in the fuel complexes over time. Based on the fuels inventory and appraisal data fuels treatment strategies including mechanical and biomass utilization have been implemented on the demonstration plots. Protocols derived to measure and manipulate hazardous fuels on managed and naturally disturbed sites such as insect infestations can then be applied on a broad scale to other areas experiencing similar perturbations.

Parcelas demostrativas para la comparación del acomodo de trozos con relación al manejo de *Dendroctonus rufipennis* (Kirby)

La actividad del escarabajo de Picea aumento dramáticamente, en la Intermontaña de los Bosques Nacionales desde 1987. Entre 1995 y 2001 el escarabajo de Picea infesto alrededor de 200,000 acres aproximadamente del bosque de Abeto-Picea resultando la muerte de alrededor de 700,000 árboles. La extensa mortalidad de arboles; por lo tanto, incremento el volumen de materia combustible en las áreas afectadas. Surgió la necesidad de imponer varios tratamientos de densidad que sugirieran hacia donde se inclinaba la balanza, conocer la distribución espacial para reducir las poblaciones, así como el ataque del descortezador de Picea. Estos tratamientos, sin

embargo, también causaron la producción de grandes volúmenes de combustible e incrementaron las cargas de combustible ligero. Como consecuencia, el riesgo de ignición y el potencial por el comportamiento del fuego extremo en postratamientos pudieran exceder a las muertes actuales, e incrementa el riesgo de fuego en áreas naturales. Esta situación proveerá de una única oportunidad de establecer sitios permanentes de demostración de tratamientos de muerte causada por el descortezador de Picea, para conducir inventarios, apreciaciones y con el tiempo evaluar los cambios de los grupos de combustibles. Basado en el inventario de combustibles y de apreciaciones para la evaluación de estrategias que incluyen mecanismos y la utilización de biomasa que ya han sido puestos en práctica en los sitios de demostración. Protocolos sacados para medir y manipular combustibles sobre disturbios naturales arriesgados, una vez localizados los sitios y tratamientos pueden ser utilizados en otros lugares.

18$_E$ Diversity and abundance of insects associated with the foliage of oyamel (*Abies religiosa* [H.B.K.] Schl. et Cham) in the national park Desierto de los Leones, Mexico

18$_S$ Diversidad y abundancia de insectos asociados al follaje del oyamel (*Abies religiosa* [H.B.K] Schl. et Cham.) en el Parque Nacional Desierto de los Leones. (Proyecto conacyt 3702b) México.

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Diversity and abundance of insects associated with the foliage of oyamel (*Abies religiosa* [H.B.K.] Schl. et Cham) in the national park Desierto de los Leones, Mexico.

The oyamel forest *(Abies religiosa)* [H.B.K] Schl. et Cham) grows in places of high elevations between 2400 and 3600 m. b. s. l in slopes from 17 to 60 degrees its presence is determined primarily by high humidity. The Desierto de los Leones National Park is located in the Distrito Federal among the Cuajimalpa and Álvaro Obregón Delegations, has a surface of 1,529 hectares. Considering its importance the abundance and diversity of insects associated to the oyamel foliage was determined. The collecting was done twice a month from April of the 2002 to December of the 2003 in 18 random sites. A scrimmage blanket was utilized shaking the lowest branches of trees, the material collected with a brush or entomological clamps and preserved in 70% alcohol. In the laboratory they were separated to order and family level using taxonomic keys and a data base of the found insects was elaborated, some insects were mounted and others were preserved in 70% alcohol. A total of 3324 organisms was collected of which 2888 were insects de 11 orders and 32 families,116 mites and 320 spiders. The most abundant orders were Psocoptera, Homoptera, Hemiptera, Coleoptera and Collembola. The insect populations were higher in the last months with lower temperatures, that was especially true for the Order Psocoptera which keept high population during the study, particularly at the end comparatively with other orders. In general the insects populations enlarged with regard to the time in the last months of study that went the coldest, this was due mainly to that the order Psocoptera maintained its high and more constant populations above all to the end of the study with regard to other orders.

Diversidad y abundancia de insectos asociados al oyamel (*Abies religiosa*) en el Parque Nacional Desierto de los Leones

El bosque de oyamel (*Abies religiosa* [H.B.K] Schl. et Cham), se desarrolla en sitios de alta montaña entre 2400 y 3600 m snm en pendientes de 17 a 60 grados; su presencia esta determinada sobre todo por la alta humedad. El Parque Nacional Desierto de los Leones esta ubicado en el Distrito Federal, entre las Delegaciones Cuajimalpa y Álvaro Obregón, tiene una superficie de 1,529 hectáreas. Considerando su importancia se determinó la abundancia y diversidad de insectos asociados al follaje del oyamel. Las colectas se realizaron cada quince días desde Abril del 2002 hasta Diciembre del 2003 en 18 sitios aleatorios; se utilizó una manta de

golpeo sacudiendo las ramas más bajas de árboles, el material se colectó con un pincel o pinzas entomológicas y se preservó en alcohol al 70%. En el laboratorio se separaron por orden y familia utilizando claves taxonómicas; se elaboró una base de datos con los insectos encontrados, algunos se montaron y otros se conservaron en alcohol al 70%. Se colectaron un total de 3324 organismos, de los cuales 2888 fueron insectos, separados en 11 órdenes y 32 familias; 116 ácaros y 320 arañas. Los órdenes más abundantes fueron Psocoptera, Homoptera, Hemiptera, Coleoptera y Collembola. En general las poblaciones de insectos aumentaron con respecto del tiempo en los últimos meses de estudio que fueron los más fríos, esto debido principalmente a que el orden Psocoptera mantuvo sus poblaciones más constantes y altas sobre todo al final del estudio con respecto de otros ordenes.

19_E A Comparison of Six Aerial Observers
19_S Una comparación de seis observadores aéreos

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A Comparison of Six Aerial Observers

During a pre-season aerial survey workshop for aerial sketchmappers in 1999 a practical exercise was conducted. Fourteen sketchmappers participated, each flying a one-hour sketchmapping survey in the upper Arkansas River valley of south central Colorado. Six experienced sketchmappers maps were selected for comparison. No ground truthing was completed for accuracy. The intent of the comparison was to demonstrate variability among sketchmappers. A comparison was made in the categories of number of dead Ponderosa pine trees and acres affected. Each sketchmapper was asked to document spatially the area surveyed. Only the area commonly survey by all six sketchmappers was analyzed. The number of dead trees counted ranged from 2900 to 8100. The number of affected acres ranged from 1900 to 6500. The intent of the poster was to have the reader come to his or her own conclusion about the variability of experienced sketchmappers data.

Una Comparación de Seis Observadores Aéreos

Un ejercicio práctico sobre trazado de polígonos en mapas impartido a observadores aéreos en el taller de inspección aérea, fue conducido en 1999 durante las labores de pre-estación. Un total de catorce participantes a dicho taller sobrevoló por una hora la parte alta del Río Arkansas localizada al centro sur de Colorado ejercitándose en el trazado de polígonos en mapas. Se seleccionaron seis dibujantes con experiencia para establecer comparaciones. No se realizaron trabajos de campo tendientes a evaluar los resultados obtenidos. La intención de la comparación fue básicamente demostrar la discrepancia de bosquejos entre los participantes. Una comparación fue hecha en las categorías de número de árboles muertos de pino ponderosa y acres afectados. Se requirió de cada dibujante documentar el área inspeccionada. Se analizó solamente el área inspeccionada por los seis observadores aéreos. El recuento de árboles muertos osciló entre los 2900 a 8100. El número de acres afectados osciló entre los 1900 a 6500. El intento de este póster fue dejar que el lector hiciera su propia conclusión acerca de la discrepancia en los datos experimentados en el trazado de polígonos en un mapa.

20_E Effects of fire severity and salvage logging on boreal forest biodiversity
20_S El efecto de la intensidad de la quema y la tala a la Biodiversidad al Bosque Boreal

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Effects of fire severity and salvage logging on boreal forest biodiversity

Forest fires are among the most important natural disturbance events on the boreal forests of Canada and thus have potentially a crucial effect on the abundance and distribution of forest species in this region. Forest industries, however, carry out intensive logging right after the fire, thus removing huge amounts of potential food, shelter and nesting sites of various forest organisms. Our poster advertises an ongoing research project at the House River fire area, Alberta, Canada. The focuses of our project are on post-fire logging, fire intensity, and their importance on multiple taxa (including ground beetles) at different spatial scales. During the years 2003 and 2004, saproxylic and ground-dwelling beetles, woodpeckers, songbirds, vascular plants, lichens and various environmental factors potentially affecting the abundance of these will be sampled in 24 landscapes. Each landscape is 2.5 x 2.5 km in size, and differs from the others in respect to the pre-fire amount of merchantable timber (low or high) and the intensity of post-fire logging (control with no logging and low, moderate or high removal of merchantable timber). In each landscape there are 16 sampling sites, all in mixedwood stands (Trembling aspen and White spruce), with varying degrees of salvage logging.

El efecto de la Intensidad de la Quema y la Tala a la Biodiversidad al Bosque Boreal

El fuego en el bosque es de los disturbios naturales más importantes en los bosques boreales de Canada y tienen potencialmente un efecto crucial en la abundancia y la distribución de las especies del bosque en esta región. Las industrias forestales, sin embargo, realizan la tala intensiva después de un incendio, así remueven y asciende enormemente el alimento potencial, de abrigo y de sitios de anidamiento de varios organismos del bosque. Nuestro cartel anuncia un proyecto de investigación en un área de fuego en la Casa River en Alberta, Canada. El foco de nuestro proyecto está en registrar los efectos después del fuego, la intensidad del fuego, y su importancia en múltiples taxa (incluyendo escarabajos de tierra) en diversas escalas espaciales. Durante los años 2003 y 2004, los escarabajos saprófitos y los que viven en la tierra, los pájaros carpinteros, aves canoras, las plantas vasculares, los líquenes y varios factores ambientales que están afectando potencialmente la abundancia de éstos; serán muestreados 24 lugares. Cada lugar es de 2.5 x 2.5 kilómetros de tamaño, y la diferencia de los otros por lo que se refiere a la cantidad del pre-fuego de madera comercial (baja o alta) y a la intensidad registrada después del fuego (control sin registro y retiro bajo, moderado o alto de la madera comercial). En cada paisaje hay 16 sitios de muestreo, todos en los soportes de madera mixta en pie (álamo temblón y piceas blancas), con grados que varían de registro en la restauración.

21_E Chips and D.I.P.S. (Drawing in Pine Scolytidae): Effective slash management in the wildland-urban interface or a recipe for disaster?

21_S Astillas y D.I.P.S.: ¿Un manejo efectivo de desechos de la corta o una receta para el desastre?

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Chips and D.I.P.S. (Drawing in Pine Scolytidae): Effective slash management in the wildland-urban interface or a recipe for disaster?

A relatively new method of treating green thinning slash is to chip or shred the material on site. Anecdotal information suggests that bark beetles are attracted to host volatiles emanating from fresh chips. Thus, chipping of slash may result in increased mortality of nearby residual trees. The purpose of this study is to determine the most effective means of minimizing impacts caused by bark beetles when treating slash by chipping. Specific objectives include: 1) Determining the effects of slash management treatments (chipping versus lop-and-scatter) and season (spring versus late summer) on bark beetle-caused ponderosa pine mortality; 2) determining the effect of distance

between chipped material and potential host trees on bark beetle-caused ponderosa pine mortality; and 3) quantifying the composition and emission rates of volatile mono- and sesqui-terpenes from chips versus slash. Three study sites (two in Arizona and one in California) were selected to include the following treatments: 1) chipping in spring, with random chip dispersal; 2) chipping in spring, with chips raked 2 m from root collar of residual trees; 3) chipping in late summer, with random chip dispersal; 4) chipping in late summer, with chips raked 2 m from root collar of residual trees; 5) spring lop-and-scatter; 6) late summer lop-and-scatter; and 7) control plots with no thinning. To date, late summer treatments were completed at all sites. Preliminary findings indicate that both *Dendroctonus* and *Ips* beetles are attracted to fresh ponderosa pine chips. Furthermore, initial large treatment differences in bark beetle attacks on residual trees were found with most attacks occurring in the chipping with no raking treatment. Based on the findings of this study, we will develop guidelines for land managers to mitigate unwanted tree mortality associated with thinning projects that include chipping.

Astillas y D.I.P.S.: ¿Un manejo efectivo de desechos de la corta o una receta para el desastre?

Un método relativamente nuevo de tratamiento para la astilla corta. Información anécdota sugiere que el descortezador es atraído por emanaciones volátiles de virutas frescas. Así, al saltar las astillas verticalmente puede dar lugar al aumento de la mortalidad de árboles residuales próximos. La propuesta en este estudio es determinar la más efectiva forma de minimizar impactos causados por descortezadores cuando se esta cortando la astilla. Los objetivos específicos incluyen: 1)Determinación de los efectos de tratamiento de los cortes verticales (que saltan en tala y dispersión) y de la estación (primavera contra verano tardío) en descortezadores causan la muerte de *Pinus ponderosa*; 2) Determinando los efectos de distancia salteada entre los materiales y potenciales de los árboles y los descortezadores que causan la muerte del pino; y 3) cuantificando la composición y tarifas de emisión de volátiles de mono y sesqui-terpenos de virutas contra astillas. Tres sitios de estudio (2 en Arizona y uno en California) fueron seleccionadas incluyendo los siguientes parámetros: 1) astillas en primavera, con dispersión de virutas al azar. 2) astillas en primavera, con virutas rastrilladas a dos metros del collar de la raíz de los árboles residuales; 3) virutas en verano tardío, al azar con virutas dispersas; 4) virutas en verano tardío, con virutas rastrilladas a 2 metros del collar de la raíz de árboles residuales; 5) diversión y poda en primavera; 6) verano tardío, poda y dispersión; y 7) control de los diagramas sin enrarecer. Hasta la fecha los tratamientos de verano tardío están completos en todos los sitios. Resultados preliminares indican que ambos escarabajos, *Dendroctonus* e *Ips* son atraídos por la virutas frescas de *Pinus ponderosa.* Además, las grandes diferencias del tratamiento inicial en ataques del escarabajo de corteza contra árboles residuales fueron encontradas con la mayoría de los ataques que ocurrían sin saltar el tratamiento del rastrillo. De acuerdo con los resultados de este estudio, desarrollaremos las pautas para que los encargados de la tierra atenúen la mortalidad indeseada del árbol asociada a los proyectos que incluyen la dispersión de las virutas.

22$_E$ α-Pinene and Limonene: Host kairomones for the white pine cone beetle, *Conophthorus coniperda* (Schwarz) (Coleoptera: Scolytidae

22$_S$ α-Pineno y Limoneno: Kairomonas del hospedero para *Conophthorus coniperda* (Schwarz), el escarabajo del cono del pino blanco

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α-Pinene and Limonene: Host kairomones for the white pine cone beetle, *Conophthorus coniperda* (Schwarz) (Coleoptera: Scolytidae)

1. Limonene attracts male cone beetles to traps, with and without pityol.

2. No interaction between (+)- and (-)-limonene on beetle response.
3. (+)-α-Pinene interrupts synergy of (-)-α-pinene with pityol.
4. No interaction between limonene and (-)-α-pinene, with and without pityol.
5. β-Pinene interrupts attraction of beetles to pityol and (-)-α-pinene.
6. Variation in dose response to (-)-α-pinene may separate beetles from the predator, *Thanasimus dubius* (Cleridae).

α-Pineno y Limoneno: Kairomonas del hospedero para *Conophthorus coniperda* (Schwarz), el escarabajo del cono del pino blanco

1. El Limoneno atrae escarabajos machos a trampas con y sin pityol.
2. Ninguna interacción existe entre (+)- y (-)-limoneno en la respuesta de escarabajo.
3. (+)-α-Pineno interrumpe la sinergia de (-)-α-pineno con pityol.
4. Ninguna interacción existe entre limoneno y (-)-α-pineno con y sin pityol.
5. β-Pineno interrumpe la atracción del escarabajos al pityol y (-)-α-pineno.
6. La variación en la respuesta a distintas dosis de (-)-α-pinene puede separar a los escarabajos de su depredador, *Thanasimus dubius* (Cleridae).

23$_E$ Field behavior and biology of the tent caterpillar *Malacosoma incurvum* in the willow (*Salix bomplandiana*) in Xochimilco, Federal District, Mexico

23$_S$ Comportamiento y biología en campo de *Malacosoma incurvum* en ahuejote (*Salix bomplandiana*) en Xochimilco, Distrito Federal, México

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Field behavior and biology of the tent caterpillar *Malacosoma incurvum* in the willow (*Salix bomplandiana*) in Xochimilco, Federal District, Mexico

The species *Malacosoma incurvum* (Lepidoptera: Lasiocampidae) causes serious phytosanitary problems to the trees in Xochimilco, Distrito Federal, caused serious defoliation in ahuejote (*Salix bomplandiana*) which generates alterations in the agricultural, ecological, social, and tourist areas of Xochimilco. The behavior and biology of *M. incurvum* was evaluated in the field. Most egg masses were found in young branches (smooth stems) with an average of 300 egg per mass; the larval development started in middle January, 2003, in which a displacement of first instar larvae was observed from 0.60 to 1.20 meters from egg masses, until it finds the apex of growth; the feeding starts in tender buds at the same time the construction of larval silk tent, size increases gradually according to the instars larvae (five instars), their size changes from 5 cm to 45 cm. of length, the tent construction was completed in 48 days; many larvae became silken cocoon inside the same larval silk tent to be protected from their predators, however some of them spun cocoons in stems and walls. The development of this pupal stage was completed in eight days and the adult in three to five days, then courtship and oviposition took place. Finally, it was observed that the egg remains in the field for about 306 days until the larvae emerge the following year.

Comportamiento y biología en campo de *Malacosoma incurvum* en ahuejote (*Salix bomplandiana*) en Xochimilco, Distrito Federal, México

La especie *Malacosoma incurvum* (Lepidoptera: Lasiocampidae) ocasiona serios problemas fitosanitarios al arbolado de la zona Chinampera de Xochimilco en el Distrito Federal, causando defoliaciones en ahuejote (*Salix bomplandiana)*, lo cual genera alteraciones en las áreas agrícolas, ecológicas, sociales y turísticas de la región. Se evaluó el comportamiento y biología de *M. incurvum* en el campo. La mayor cantidad de masas de huevos se encontró en ramas jóvenes (tallos lisos) con un promedio de 300 huevos por masa; el desarrollo larvario inició a mediados del mes enero del 2003, en el que se observó un desplazamiento de larvas de primer instar de 0.60 a

1.20 metros de distancia a partir de la masa de huevos, hasta encontrar los ápices de crecimiento; iniciando su alimentación en brotes tiernos y la construcción de una bolsa de seda, misma que aumentó su tamaño paulatinamente de acuerdo a los instares larvarios (cinco instares), iniciando su tamaño desde 5 cm hasta 45 cm. de longitud, desarrollo que duró 48 días; la mayoría de las larvas puparon dentro de las mismas bolsas de seda para protegerse de sus depredadores, algunas, lo hicieron en troncos y paredes. La duración del estado pupal fue de ocho días y del estado adulto fue de tres a cinco días, durante el cual se realizó el cortejo y la oviposición. Finalmente, se observó que el estado de huevo dura en el campo 306 días hasta la emergencia de las larvas el año siguiente.

24$_E$ Remote sensing application to estimate Ips bark beetle damage to Jeffrey and Pinyon Pine in Sierra Juárez Baja California, Mexico

24$_S$ Estimación del nivel de afectación de descortezadores del género *Ips* en la Sierra Juárez, Baja California, México mediante sensores remotos

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Estimación del nivel de afectación de descortezadores del género *Ips* en la Sierra Juárez, Baja California, México mediante sensores remotos

La península de Baja California presenta una cadena de sierras montañosas que corre de forma longitudinal y que presenta características de gran valor ecológico y climático, en donde podemos encontrar flora y fauna distintiva de la zona desértica que las rodea, constituyendo una "isla" que en su parte mas alta presenta un bosque de *Pinus jeffreyi* y grandes áreas de chaparral. El presente documento establece una metodología, que mediante el uso de percepción remota, permita contar con variables y elementos de toma de decisión que coadyuven en la identificación de áreas forestales que presentan características de debilitamiento en el vigor de la masa forestal derivado de plagas, enfermedades o estrés hídrico, siendo este ultimo un factor importante en el incremento en la susceptibilidad de las masas forestales al ataque de agentes patógenos. Considerando lo anterior y la posibilidad de tener análisis multitemporal del área y los factores que provocan el surgimiento de una plaga o enfermedad, nos permitan establecer acciones de prevención y/o monitoreo para su combate y control. El presente estudio se realizó mediante el uso de imágenes Landsat 7 de diferentes fechas de la zona, así como muestreos de campo y la utilización de GPS (Sistemas de Posicionamiento Global) para el establecimiento de las firmas espectrales de los sitios que presentaban ataque de plagas.

25$_E$ Diversity and abundance of Myriapoda (Diplopoda, Chilopoda) in spotted knapweed (*Centaurea maculosa*) invaded and uninvaded savannas of the Northern Rocky Mountains

25$_S$ La diversidad y la abundancia de Myriapoda (Diplopoda, Chilopoda) en savannas de las Rocky Mountains norte invadido y no invadido por la cizaña (*Centaurea maculosa*)

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26$_E$ FVS-BGC: A physiology model to simulate stand stress and vigor

26$_S$ FVS-BGC: Un modelo de la fisiología para simular la tensión y el vigor del soporte

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FVS-BGC: A physiology model to simulate stand stress and vigor

Traditionally, managers have used thinning prescriptions to reduce bark beetle hazards, with a goal of applying them when stand densities exceed a threshold level. Stand projection systems such as FVS have been used to estimate when stands will exceed that threshold. This approach assumes that stand density is closely linked to stand vigor. In the real world, variable weather conditions effects growth rates, mortality rates, and creates periods of low tree vigor that

contributes to pest epidemics. FVS-BGC is a hybrid stand growth model that adds the logic of the Stand-BGC physiological process model to the Forest Service's Forest Vegetation Simulator (FVS). FVS operates on a five to ten year time step and assumes average climate conditions and stable site conditions over each time period. The "BGC" portion of this model uses climate data to operate on a daily time step. This fine scale approach allows users to project variation in stand vigor conditions among years, as well as estimating moisture stress conditions within in year. Previous studies have found a strong relationship between stand vigor and susceptibility to bark beetle attack. Using FVS-BGC, we demonstrate how stand growth and normal climate variability combine to create a wide age and density band during which a vigor-based threshold might be crossed. Using climate records for example stands, we calculate probabilities of exceeding this vigor threshold at different ages. We also demonstrate how the interactions of site characteristics influence stand growth potential and vigor conditions.

FVS-BGC: Un modelo de la fisiología para simular la tensión y el vigor del soporte

Tradicionalmente, los encargados han utilizado prescripciones que enrarecían para reducir peligros del escarabajo de corteza, con una meta de aplicarlos cuando las densidades de soporte exceden un límite de alarma. Los sistemas de la proyección del soporte tales como FVS se han utilizado para estimar cuando los soportes excederán ese umbral. Este acercamiento asume que la densidad de soporte está ligada de cerca al vigor del soporte. En el mundo verdadero, las condiciones atmosféricas variables efectúan tarifas de crecimiento, la mortalidad clasifica, y crea períodos del vigor bajo del árbol que contribuye a las epidemias del parásito. FVS-BGC es un modelo híbrido del crecimiento del soporte que agrega la lógica del Esta' parado-BGC el modelo de proceso fisiológico al simulador de la vegetación forestal del servicio del bosque (FVS). FVS funciona encendido paso del tiempo de un año cinco a diez y asume las condiciones de clima medias y período estable del excedente de las condiciones del sitio cada vez. La porción de "BGC" de este modelo utiliza datos del clima para funcionar encendido un paso diario del tiempo. Este acercamiento fino de la escala permite que los usuarios proyecten la variación en condiciones del vigor del soporte entre años, así como estimar condiciones de la tensión de la humedad dentro en año. Los estudios anteriores han encontrado una relación fuerte entre el vigor del soporte y la susceptibilidad al ataque del escarabajo de corteza. Usando FVS-BGC, demostramos cómo el crecimiento del soporte y la variabilidad normal del clima combinan para crear una venda ancha de la edad y de la densidad durante la cual un umbral vigor-basado pudo ser cruzado. Usar expedientes del clima por ejemplo está parado, nosotros calculamos las probabilidades de exceder este umbral del vigor en diversas edades. También demostramos cómo las interacciones de la influencia de las características del sitio están paradas condiciones del potencial y del vigor de crecimiento.

27_E Digital Aerial Sketchmapping System for Insect and Disease Detection in Oregon and Washington

27_S Mapeo aéreo para la detección de insectos y plagas en los estados de Oregon y Washington, USA

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Digital Aerial Sketchmapping System for Insect and Disease Detection in Oregon and Washington

The Digital Aerial Sketchmapping System (DASM) is used in Oregon and Washington to conduct the annual overview survey that records insect and disease damage on all forested lands in each state. DASM uses current computer, navigation, and cartographic technology to accurately map polygons of damage. The system is comprised of a laptop computer, touchscreen and a Global Positioning System (GPS) unit. The laptop computers are securely mounted on a rack, which is attached to the seat rails, and operate off of the aircraft power supply. Several different background maps are used during the survey: panchromatic, digital USGS 100K quads, and Brovey images. The DASM allows a GIS specialist to create and post maps to a web site, which allows resource managers to view survey data days after it was collected. This poster was presented at the Western Forest Insect Work Conference in Guadalajara, Mexico, November 2003.

Mapeo aéreo para la detección de insectos y plagas en los Estados de Oregon y Washington, USA

El sistema digital aéreo Sketchmapping (DASM) se utiliza en Oregon y Washington para conducir la encuesta anual sobre la distribución que registra el insecto y el daño de la enfermedad en todas las tierras arboladas en cada Estado. DASM utiliza la computadora actual, la navegación, y la tecnología cartográfica para trazar exactamente los polígonos del daño. El sistema consta de una computadora portátil, con toque en la pantalla y de un sistema mundial de geoposicionamiento (GPS). Las computadoras portátiles se montan con seguridad en un estante, que se une a los carriles de asiento, y funciona independiente de la alimentación energética del avión. Diversos mapas del fondo se utilizan durante el examen: cuadrángulos pancromáticos, digitales de USGS 100K, e imágenes de Brovey. El DASM permite que los especialistas creen y fijen mapas a un Web site, que permite que los encargados del recurso vean los datos después de ser tomados.

28$_E$ Pheromone preferences of two populations of *Ips pini* (Say)

28$_S$ Preferencias de feromonas en dos poblaciones del descortezador *Ips pini* (Say)

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Pheromone preferences of two populations of *Ips pini* (Say)

Pine engraver, *Ips pini* (Say), is a widely distributed bark beetle of North American coniferous forests. Generally, healthy trees are not attacked by pine engraver, but when environmental conditions are conducive to population increases, beetles begin colonizing and killing live trees. During the colonization, males release ipsdienol, the principal attractant described as the ratio of its two optical isomers R-(-) and S-(+), as well as synergistic compounds such as lanierone. This production of, as well as the response to pheromones by pine engraver varies across geographic regions, complicating the use of pheromones in management. The objective of this study was to determine the preference of pine engraver to different isomeric ratios of ipsdienol and to lanierone in western Montana and northern Arizona. In 2000, 2001, and 2002 five enantiomeric ratios of ipsdienol ranging from -97/+3 to -3/+97 were tested with and without the synergist lanierone. Results indicated that attraction increased with increased ratio of negative ipsdienol except in the absence of lanierone in Arizona where trap catches were consistently low. Trap catches for both Montana and Arizona indicated that lanierone was an important synergist to the ipsdienol and may be necessary for attraction in northern Arizona. Overall, -97/+03 ipsdienol plus lanierone was the most attractive lure for pine engraver beetle populations in both western Montana and northern Arizona. This combination is recommended for future trapping efforts in both regions where maximum catch of pine engraver is needed.

Preferencias de feromonas en dos poblaciones del descortezador *Ips pini* (Say)

El descortezador *Ips pini* (Say) esta distribuido por América del Norte en bosques de coníferas. Generalmente, los árboles sanos no son atacados, pero cuando las condiciones ambientales cambian conducen al incremento de las poblaciones del descortezador y pueden colonizar y matar árboles vivos. Durante el proceso de colonización, el macho produce ipsdienol, el atrayente principal descrito por la proporción de los isomeros ópticos (R)-(-) y S-(+), y otros componentes como lanierone. Esta producción, tal como la respuesta, a las feromonas es variable en las regiones geográficas. Esto hace el manejo de *Ips pini* por feromonas más difícil. El objetivo del estudio fue determinar la preferencia de *Ips pini* a los isomeros de ipsdienol y la adición de lanierone en dos estados de E.E.U.U. Las pruebas usaban cinco proporciones de ipsdienol (de menos a más), sin y con lanierone. Los resultados indican que la atracción de *Ips pini* esta aumentando por el isomero negativo. La excepción única fue el caso de tratamientos sin lanierone en Arizona donde la falta de lanierone resulto en números demasiados bajos. Los números indican que lanieron aumento la atracción sinérgica y puede ser necesario para la atracción en Arizona. La combinación de -97/+3 ipsdienol más lanierone fue la combinación mas atractiva a *Ips pini* en los dos sitios. Esta combinación es recomendable en estas regiones cuando se quiera capturar lo más posible.

29_E Species of coniferous bark beetle from northeast Mexico

29_S Especies de insectos descortezadores de coníferas del noreste de México

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Species of coniferous bark beetle from northeast Mexico

By the middle of 1999, in the forests of Coahuila and Nuevo Leon, coniferous bark beetles were detected in a area close to 25,000 hectares, out of which, 1261 were strongly affected and distributed in large spots which favored its quick dissemination. Because of the lack of knowledge of the causal agents, it became necessary to carry out this work, with the purpose of identifying the insect species that attack the forests of the northeast part of Mexico. To fulfill this work, collections of attacking insects were taken to the laboratory for their identification. This work was established in the Campo Experimental Saltillo, Genitalia and Karyotype techniques were used. The following results were found: the damage to *Pseudotsugae flahaultii* Flous is caused by *Dendroctonus pseudotsugae* Hopkins. *Abies vejarii* Martínez is attacked by *Scolytus* spp in top of the tree and *Pseudohylesinus* spp in the lower part of the stem; *Dendroctonus adjunctus* Blandford damage *Pinus rudis* Endl. and *Phloesinus* spp to *Cupressus arizonica* Greene. It was also found that young trees of the *Abies*, *Pseudotsugae* and all pine species are attacked by the *Pityophthorus* spp. At the same time, *Pinus teocote* Schiede and *Pinus pseudostrobus* Lindl. are damaged by *Dendroctonus mexicanus* Hopkins and *Pinus arizonica* Engelm. by *Dendroctonus brevicomis* LeConte.

Especies de insectos descortezadores de coníferas del noreste de México

A mediados de 1999, en los bosques de los estados de Coahuila y Nuevo León, México, se detectó la presencia de escarabajos descortezadores de coníferas en una superficie cercana a las 25,000 ha, de las cuales 1261 se encontraban fuertemente afectadas y distribuidas en manchones; tal condición favoreció su rápida diseminación y permitió que las poblaciones pudieran crecer rápidamente e infestar miles de árboles en pocas semanas. Considerando el desconocimiento de los agentes causales, se propuso llevar a cabo este trabajo con el objetivo de identificar las principales especies de insectos descortezadores que afectan a los bosques del noreste de México. Para este trabajo, se colectaron insectos descortezadores en los diferentes hospederos, con la finalidad de ser identificados en el laboratorio del Campo Experimental Saltillo del INIFAP. Para la identificación se utilizaron las técnicas de la Genitalia y del Cariotipo. Como resultado de este estudio, se encontró que el ataque primario a *Pseudotsuga flahaultii* Flous fue causado por *Dendroctonus pseudotsugae* Hopkins; *Abies vejarii* Martínez es atacado por *Scolytus* spp, en la parte alta y por *Pseudohylesinus* spp en la parte baja del fuste; a *Pinus rudis* Endl. lo ataca *Dendroctonus adjunctus* Blandford; a *Cupressus arizonica* Greene lo ataca *Phloeosinus* spp y en árboles jóvenes de oyameles y pinos se encontró *Pityophthorus* spp; *Pinus teocote* Schiede y *Pinus pseudostrobus* Lindl. son atacados por *Dendroctonus mexicanus* Hopkins y *Pinus arizonica* Engelm. por *Dendroctonus brevicomis* LeConte.

30_E Evaluation of aggregation pheromones of *Dendroctonus adjunctus* Blandford in Coahuila State forest

30_S Evaluación de Feromonas para la congregación de *Dendroctonus adjunctus* Blandford en los bosques del estado de Coahuila

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Evaluation of aggregation pheromones of *Dendroctonus adjunctus* Blandford in Coahuila State forest

In the last decade the forests of the state of Coahuila have been affected by adverse climatological conditions, such as high temperatures and droughts, that which has resulted in a stress of these coniferous forests. This situation makes them more susceptible to the attack of bark beetle whose affectation in the last years embraced a surface of 811 ha. The actions to control the different foci were based on the application of traditional direct methods, regulated by the SEMARNAT which implies the demolition of the infested trees and the use of a chemical product, This method has been thoroughly questioned by society, this, in addition to the high costs that it's application generates. At the present there are no better options, such as the implementation of a method that includes the use of pheromone-baited traps. The present work was carried out in the sierra of Arteaga Coahuila, in a place called Port of the Cruz located to an altitude of 2730 ASL, and exposition NE. The objective of this work was to determine the effect of two pheromones in the aggregation of *D. adjunctus* in a forest of *Pinus rudis*. In this location 12 Lindgren traps of 16 funnels, baited with the pheromones Frontalina and Brevicomina were placed in foci with emergent populations. A total of 1147 specimens of *D. adjunctus* were captured in a period of 12 months. The treatment of Frontalina + Brevicomina showed the biggest attraction on this bark beetle, having captured 67.8% of the total, followed by the treatment of Frontalina with 30.03%.

Evaluación de Feromonas para la congregación de *Dendroctonus adjunctus* Blandford en los bosques del estado de Coahuila

En la última década los bosques del estado de Coahuila han sido afectados por condiciones climatológicas adversas, tales como altas temperaturas y sequías, lo cual ha traído como consecuencia un estrés de las coníferas de estos bosques, lo que los hace más susceptibles al ataque por escarabajos descortezadores, cuya afectación en los últimos años abarcó una superficie de 811 ha. Las acciones para controlar los diversos brotes se basaron en la aplicación de métodos directos tradicionales, reglamentados por la SEMARNAT, que implica el derribo del arbolado infestado y la utilización de un producto químico, método cuestionado ampliamente por la sociedad, además de los altos costos que genera su aplicación. Actualmente no se cuenta con mejores opciones, como lo pueden ser la implementación de un método que incluya el uso de trampas cebadas con feromonas. El presente trabajo se llevo a cabo en la Sierra de Arteaga Coahuila, en el predio "Puerto de la Cruz" localizado a una altitud de 2730, con exposición NE. Con el objetivo de determinar el efecto de dos feromonas en la congregación de *D. adjunctus* en un bosque de *Pinus rudis*. En esta localidad se colocaron, dentro de brotes con poblaciones emergentes, 12 trampas "Lindgren" de 16 embudos, cebadas con las feromonas Frontalina y Brevicomina. Se capturó un total de 1147 especimenes de *D. adjunctus* en un período de 12 meses. El tratamiento de Frontalita + Brevicomina fue el que mayor atracción tuvo sobre este descortezador, capturando el 67.8 % del total, seguido del tratamiento de Frontalina con el 30.03%.

31$_E$ Occurrence of the eucalyptus psyllid *Glycaspis brimblecombei* (Hemiptera: Psyllidae) in plantations of eucalyptus in Brazil

31$_S$ Ocurrencia del Psílido del eucalipto *Glycaspis brimblecombei* (Hemiptera: Psyllidae) en plantaciones de eucalipto en Brasil

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Occurrence of the eucalyptus psyllid *Glycaspis brimblecombei* (Hemiptera: Psyllidae) in plantations of eucalyptus in Brazil

In the lasts decades the problem with exotic forest pests has been increasing in Brazil, mostly with the woodwasp (*Sirex noctilio*) and pine aphids (*Cinara pinivora* and *C. atlantica*) introductions in *Pinus* forests. In June, 2003 the Red Gum Lerp Psyllid (*Glycaspis brimblecombei*) was detected in eucalyptus forests in State of São Paulo, causing defoliation, sooty mold and dieback in *Eucalyptus camaldulensis* and in hybrid clones *E. grandis x urophylla* plantations. Actually, this pest is distributed in 4 Brazilian states. *E. camaldulensis, E. tereticornis, E. urophylla, E. grandis* and eucalyptus hybrids are the most attacked by RLP, in an area of 200,000 ha. Damage assessments and tests with chemical insecticides are being carried out in the field. As a RLP control strategy a classic biological control project is beginning next year, involving Universities, Research institutes and Brazilian forest companies, in cooperation with CONAFOR, Mexico, to introduce the parasitoid *Psyllaephagus bliteus* (Hymenoptera: Encyrtidae) to Brazil. Other studies, to evaluate native natural enemies, insecticides and eucalyptus resistance, have been carried out.

Ocurrencia del Psílido del eucalipto *Glycaspis brimblecombei* (Hemiptera: Psyllidae) en plantaciones de eucalipto en Brasil

En las últimas décadas el problema con plagas forestales exóticas a aumentado en Brasil, principalmente con las introducciones de la avispa de la madera (*Sirex noctilio*) y de los pulgones de *Pinus* (*Cinara pinivora* e *C. atlantica*) en los bosques de *Pinus*. En junio de 2003 fue detectada la presencia del psilído-de-conchuela (*Glycaspis brimblecombei*) en plantaciones forestales de eucalipto en el Estado de São Paulo, causando perdida de hojas, fumagina y secamiento de los punteros en plantíos de *Eucalyptus camaldulensis* y de clones híbridos *E. grandis x urophylla* ("urograndis"). Actualmente, la plaga se encuentra distribuida por 4 estados brasileños, siendo las especies *E. camaldulensis, E. tereticornis, E. urophylla, E. grandis* y híbridos de eucalipto las más atacadas, en área de aproximadamente 200.000 ha. El estudio de la bioecología del insecto, levantamientos de daños y testes con insecticidas químicos están siendo realizados. Como estrategia de control del Psílido del eucalipto a medio y largo plazo está siendo iniciado un proyecto de control biológico clásico, envolviendo universidades, instituciones de investigación, y empresas forestales brasileñas en conjunto con CONAFOR, México para introducción del parasitoide *Psyllaephagus bliteus* (Hymenoptera: Encyrtidae) para Brasil. Otras investigaciones, como evaluación de enemigos naturales nativos, insecticidas y resistencia en clones de eucaliptos han sido empezados.

32_E Ponderosa pine water stress and oleoresin production in three forest conditions in northern Arizona, E.E.U.U.

32_S Producción de resina y estrés hídrico de pino ponderosa en tres condiciones de bosque en el norte de Arizona, E.E.U.U.

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Ponderosa pine water stress and oleoresin production in three forest conditions in northern Arizona.

We measured leaf predawn water potential and oleoresin production of ponderosa pines (*Pinus ponderosa*) during summer 2003 flights of *Dendroctonus brevicomis* and *Ips pini* in three forest

conditions (shown at right) in the Coconino National Forest near Flagstaff, Arizona. We measured trees in four replicate stands of each forest condition. Consistent with our hypothesis, trees in unmanaged stands had significantly more negative predawn water potential compared to trees in thinned and thinned + burned stands. Predawn water potential did not differ between thinned and thinned + burned stands. Contrary to our hypothesis of greater oleoresin production in managed forest stands, resin production did not significantly differ among forest conditions. In an experiment where we baited trees with synthetic *D. brevicomis* pheromones, all trees were attacked and mortality was 80-85% over all stand conditions. Trap catches of *Ips pini* increased throughout June to the end of our monitoring period in early July and did not differ strongly among forest conditions. *D. brevicomis* catches peaked in the second week of July and were greatest in the unmanaged forest condition. Our results suggest that thinning 10-13 years ago reduced tree water stress in year 2003, but did not influence oleoresin production or tree resistance to mass attack of *D. brevicomis*.

Producción de resina y estrés hídrico de pino ponderosa en tres condiciones de bosque en el norte de Arizona, E.E.U.U.

Medimos agua potencial de hoja pre-amanecer y producción de oleorresina de pino ponderosa (*Pinus ponderosa*) 2003 durante la época volador vernal de *Dendroctonus brevicomis* y *Ips pini* en bosques de tres condiciones (demostradas en la derecha) en Coconino bosque nacional cerca de Flagstaff, Arizona, E. E. U. U. Medimos árboles en cuatro rodales replicadas para representar cada condición. Consistente con nuestra hipótesis, árboles de rodales no manejados tienen un agua potencial pre-amanecer negativa más marcado relativo a árboles de rodales sujetados a aclareo y quemas controladas. Agua potencial pre-amanecer entre rodales aclarados y rodales aclarados y quemados no variaba. Contrario a nuestra hipótesis de mayor producción de oleorresina en rodales manejados, producción de resina no variaba significativamente entre condiciones boscosas. En un experimento atraemos *D. brevicomis* con una feromona sintética a rodales de todas clases. Los árboles con estaciones de feromonas fueron atacados con una mortalidad entre 80-85% bajo todas las condiciones boscosas. Los resultados de trampeo de *I. pini* se aumento a través de junio hasta el fin del periodo de monitoreo en los principios de julio y no variaba entre los condiciones rodales. Resultados de trapeo de *D. brevicomis* llego a su máximo en la segunda semana de julio y fueron mayor en los bosques no manejados. Nuestros resultados sugieran que el aclareo de hace 10-13 años redujo estrés de agua en el año 2003, pero no influyó producción de oleorresina o resistencia de árbol a ataque masiva de *D. brevicomis*.

Wednesday, November 5 / Miércoles, 5 de Noviembre

8:00am – 7:00 pm Field trips/ Recorridos de Campo

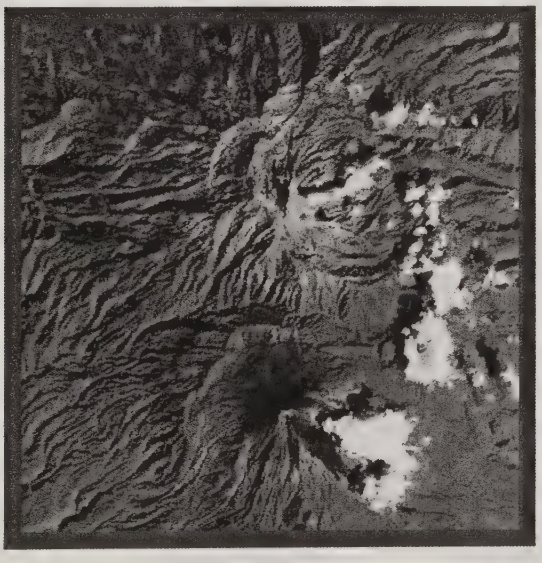
Tapalpa

Tapalpa is a quaint alpine town south of Guadalajara with pleasant cold-temperate climate. November weather is typically dry with temperatures ranging form 22oC to 6oC (max and min). Although the town is a weekend destination for many people, the pine forest surrounding the town is the basis for an active lumber industry, and recently, for eco-tourism. It is an interesting place to see multiple-use forest management and the treat posed by forest pests.

Elevation: 1950m (6400 ft)
Location: Sierra Madre Occidental, Mexico
Latitude: 19° 36' 49" - 20° 05' 54"
Longitude: 103° 36' 20" - 103° 54' 00"
Distance from Guadalajara: 129 km
Average Temperature 16.7°C
Vegetation: Pine forest
Population: 15,480

Nevado de Colima

Nevado de Colima is located along the borders of the States of Colima and Jalisco. Although he name of the mountain was given because of the snow accumulation it receives during the winter months, the elevational gradient from 1200 to 4450 meters above sea level provides climates that support a gradient of pine-oak, pine-fir and subalpine pine vegetation types. It is an interesting place to see diverse vegetation as well as forest pest management activities.



Elevation: 4450m (14,600 ft)
Location: SierL
Location: Sierra Madre Occidental, Mexico
Latitude: 19° 34' N
Longitude: 103° 36' W
Distance from Guadalajara: 165 km
Average Temperature 10°C
Vegetation: Pine, oyamel, oak, alpine pasture, thornless scrub
Best Climbing Months: Nov.-April
Surface: 9600 ha

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Western Forest Insect Work Conference

Minutes of the 2003 Executive Committee Meeting:

Executive Committee Meeting
3 November 2003

Present: Jose Negron, Chair
Sheri Smith, Secretary
Jaime Villa-Castillo, Councilor
Tim McConnell, Councilor

Jose called the meeting to order at 2:20 p.m.

Sheri Smith read the notes from the 2000 final business meeting.

OLD BUSINESS 2002

Scholarship Committee:

It was mentioned in the 2002 Executive Committee Meeting notes that there was a need to have an official one-page summary describing the WFIWC organization, its goals, and history. This would be available to those wishing to make contributions. Need a volunteer to take this on. Most of the information is on the Web.

It was mentioned in the 2001 Executive Committee Meeting notes that their was some discussion regarding the ability of the WFIWC to pay $500 to help the Scholarship Award recipient attend the meeting to make their presentation. This discussion point was not resolved. Darrell Ross will be informed of this and the Scholarship Committee can make a recommendation to the Executive Committee in San Diego, 2004.

Fund raising: Any volunteers interested in helping with fund raisers for the Scholarship Committee should contact Steve Burke, Darrell Ross or Sandy Kegley. Need to discuss ways to increase contributions.

History Committee:

History committee repository – need to revisit where the proper location should be for historical forest entomology information. Previous meeting notes indicated that the University of Idaho may not be the proper location because it had not been determined whether there was a library staff dedicated to archive or properly index those documents.

History committee needs to follow up on this. Jose will follow up and the History Committee can present its findings at the 2004 meeting.

Is Steve Seybold interested in serving on this committee? Jose will follow up.

Common names Committee:

In previous meeting notes there is mention of the need to look at woodborer common names.
Jose will remind Brytten Steed of this.

Results of Resolutions passed in 2002:

Reprints of Western Forest Insects were completed. The Executive committee would like to acknowledge Tom Hofacker with Forest Health Protection (FHP) in the Washington Office (WO) for his immediate attention to this and the WO FHP for the funding.

Is it available on CD?

The 1995 WFIWC Rapid City proceedings have been published, the Executive Committee recognizes Jose Negron for his efforts in this accomplishment.

NEW BUSINESS 2003

Treasurer's report: Submitted by Ladd Livingston

Highlights of the past year:

- One scholarship for $500 was awarded.
- We have gained a total of $3,143 into the scholarship CD's. This has come from a challenge issued by one member to the membership of the group, from the silent auction at the Whitefish meeting, from sales of souvenir items, and from any amount in the checking account over $4,000*.
- Interest totaling $242.28 was deposited from the two certificates of deposit into the savings account for use in awarding scholarships.

*All monies received are deposited into the checking account. I keep track of the amounts received from donations and sales whose specific purpose is to go into the scholarship funds. These funds, plus any balance over $4,000 from the checking account, are added to the CD's as they mature each year. After adding the new funds, the CD's are reinvested for another year.

Current Status of Accounts:

Checking Balance	$3,621.74	
Regular Savings	$1,195.91	These are the funds available for scholarships.
McGregor Fund	$5,120.00	Interest is deposited to regular savings account on a quarterly basis
Memorial Scholarship Fund	$19,395.00	Interest is deposited to regular savings account on a quarterly basis
TOTAL	$29,332.65	

Scholarship committee: Submitted by Darrell Ross. (Full report in Initial Business Meeting notes)

Kevin Dodds, a Ph.D. candidate at Oregon State University, was selected as the 2002 recipient of the Memorial Scholarship. Kevin's selection was the last activity of the original Memorial Scholarship Committee composed of Lorraine McLauchlan (chair), Don Dahlsten, and Mike Wagner. Kevin was invited to deliver a presentation of his research at the meeting in Guadalajara, but declined that invitation.

Based on the funds in the scholarship account, it was determined that $500 was the maximum sustainable amount that could be awarded each year. That was the amount given to the 2003 scholarship recipient. The committee unanimously agreed that only one scholarship should be awarded each year for several reasons in addition to the obvious financial one. It was also unanimously agreed that a small plaque should be given to the scholarship recipient each year.

Based on the activities of the Memorial Scholarship Committee over the past year, several changes were recommended to the description of the scholarship on the WFIWC website.

Brian Aukema, a Ph.D. student at the University of Wisconsin working with Dr. Kenneth Raffa, has been selected as the 2003 Memorial Scholarship recipient.

History Committee: Submitted by Mal Furniss and Boyd Wickman. (Full report in Initial Business Meeting notes)

A manuscript by Boyd Wickman, Torgy Torgersen and Mal Furniss on the historical photo file that originated at the Portland Forest Insect Laboratory was published in the Fall 2002 issue of American Entomologist (48 (3): 178-185).

The Spring 2003 issue of the American Entomologist contains an obituary for Ronald W. Stark who died in Sandpoint, Idaho, on 9 April 2002. It was written by M. Furniss, Alan Berryman, David Wood and Don Dahsten with help of his daughter, Debra, and information in Ron's Founders Award address that appears in the 1995 WFIWC Proceedings.

The Summer 2003 issue of the American Entomologist contains an article by Furniss entitled: Forest entomology in the northern Rocky Mountains: 1909-1917, as reflected in the correspondence between Josef Brunner and A. D. Hopkins. 49(2): 102-111.

The Summer 2003 issue of the American Entomologist also contains an obituary for Kenneth H. Wright, an original WFIWC member, who died at Tualatin, Oregon on 3 December 2002.

A manuscript by Furniss and Roy Renkin, Management Biologist, Yellowstone N.P., will appear in the Winter 2003 issue of the American Entomologist. It is entitled: Forest Entomology in Yellowstone National Park, 1923 – 1957. A time of discovery and learning to let live.

Boyd Wickman has written a 16-chapter manuscript entitled: Biographies of H. E. Burke and John M. Miller, encouraged by the Miller and Burke families who provided personal information and photos. He also is assisting a contract writer for the PNW station to prepare a draft of the History of forest research in Central Oregon.

Common Names Committee:

Brytten submitted a common name for *Scolytus schevyrewi* as the Banded elm bark beetle.

Founders Award: Submitted by Ken Gibson. (Full report in Initial Business Meeting notes)

Dr. John Schmid, the 2002 Founder's Award recipient will address the conference in Guadalajara in November 2003.

Dr. Don Dahlsten was selected as the 2003 recipient of the WFIWC Founder's Award.

Other Business:

Conference Committee:

Tips on how to put on the WFIWC have been put together by the Conference Committee and is available on the web site. Committee is composed of Sandy Kegley, Ken Gibson, and Barb Bentz.

Founders Award Committee:

2004 Founders Address-Jose will ask at Initial Business meeting for a recommendation for someone (1 or more people) to present the address/memorial for Don Dahlsten.

There will be a session at the 2004 joint meeting to recognize Don Dahlsten's contributions. Contact Steve Seybold (2004 Program Chair) for more information.

Scholarship Award Committee:

There was discussion regarding putting an optional line of future WFIWC registration forms for contribution to the Scholarship fund.

Other:

The Executive Committee on behalf of the WFIWC needs to recognize the following individuals. Thank you letters will be written by Jose on behalf of the WFIWC.

- Kathy Sheehan for the website development and maintenance.
- Tom Hofacker and Washington Office Forest Health Protection group for the reprints of Western Forest Insects.
- Jose Negron for his work in getting the 1995 WFIWC Proceedings published.

There was discussion regarding the desire to display the plaques to recognize previous Founders Award recipients and Scholarship Award recipients at future WFIWC meetings. Sheri Smith will follow up and make sure the plaques arrive in San Diego for the 2004 meeting.

Obituaries:

Obituary for Don Dahlsten will be read at the final business meeting and included in the meeting proceedings.

Kenneth Wright - died in Tualatin, Oregon on 3 December 2002.

New Councilors:

We appointed an ad hoc committee to recommend two new counselors to replace Sandy Kegley and Jaime Villa-Castillo.

Recent Activity and Decisions:

Revision of the Scholarship Award protocols.

Publication of the 1995 Proceedings.

Selection of San Diego for 2004 meeting site.

Membership requirement for the recipient of the Scholarship was removed. Motion passed at Whitefish.

Proceedings will be mailed to meeting attendees only. Copies will be available on the web site or through Ladd for others who did not attend the meeting.

Future meetings:

2004 San Diego
2005 Invited by Lorraine to go to Kamloops, B.C.
2006 North American Conference Insect Work Conference

Minutes of the 2003 Initial Business Meeting:

INITIAL BUSINESS MEETING
3 November 2003

Jose Negron called the meeting to order at 4:10 p.m.

Sheri Smith read the minutes of the 2002 Final Business Meeting.

Treasurer's report:
Submitted by Ladd Livingston and read by Jose Negron (attached).

Scholarship committee:
Submitted by Darrell Ross and read by Tim McConnell (attached).

History Committee:
Submitted by Mal Furniss and Boyd Wickman and read by Jose Negron (attached).

Common Names Committee:
Brytten Steed submitted a common name for *Scolytus schevyrewi* as the Banded elm bark beetle.

Founders Award Committee:
Submitted by Ken Gibson and read by Jose Negron.

Dr. John Schmid, the 2002 Founder's Award recipient will address the conference in Guadalajara in November 2003.

Dr. Don Dahlsten was selected as the 2003 recipient of the WFIWC Founder's Award.

NEW BUSINESS:

Conference Committee:
Tips on how to put on the WFIWC have been put together by the Conference Committee and are available on the WFIWC web site. Sandy Kegley, Ken Gibson, Barb Bentz

Founders Award Committee:
The 2004 Founders Address: There has been interest expressed by a number of individuals regarding the delivery of the 2004 Founders Address in honor of the recipient, Dr. Don Dahlsten. Tom Eager and Pat Shea will be in charge of coordinating the Founders Award address/memorial presentation at the 2004 meeting.

It was also discussed and there is support for a session at the 2004 joint meeting, such as a plenary session on biological control or a similar topic to recognize Dr. Don Dahlsten's contributions. Contact Steve Seybold (2004 Program Chair) for more information.

Scholarship Award Committee:
An optional line on future WFIWC registration forms will be added for contributions to the Scholarship fund. This was discussed as another way to increase the contributions to the Scholarship Award. This will be discussed further at the Final Business Meeting.

Discussion Items:
The Executive Committee on behalf of the WFIWC needs to recognize the following individuals. Thank you letters will be written by Jose on behalf of the WFIWC.

- Kathy Sheehan for the website development and maintenance.

- Tom Hofacker and Washington Office Forest Health Protection group for the reprints of Western Forest Insects.
- Jose Negron for his work in getting the 1995 WFIWC Proceedings published.

There was discussion regarding the desire to display the plaques to recognize previous Founders Award recipients and Scholarship Award recipients at future WFIWC meetings. Sheri Smith will follow up and make sure the plaques arrive in San Diego for the 2004 meeting.

Obituaries:

Obituary for Don Dahlsten will be read at the final business meeting and included in the meeting proceedings.

Kenneth Wright - died in Tualatin, OR on 3 December 2002.

Other items:

Scholarship Committee:

It was mentioned in the 2002 Executive Committee Meeting notes that there was a need to have an official one-page summary describing the WFIWC organization, its goals, and history. This would be available to those wishing to make contributions. Tim McConnell agreed to do this and anyone that wants to assist should contact Tim.

The 2001 Executive committee meeting discussed the ability of the WFIWC to pay $500 to help the Scholarship Award recipient attend the meeting to make their presentation, but is was not resolved. This topic was also discussed briefly at the 2002 meeting in Whitefish. Darrell Ross will be informed of this and the Scholarship Committee can make a recommendation at the Executive Meeting in San Diego, 2004.

Any volunteers interested in helping with fund raisers for the Scholarship Committee should contact Steve Burke or Karen Ripley.

History Committee:

History committee repository – need to revisit where the proper location should be for historical forest entomology information. Previous meeting notes indicated that the University of Idaho may not be the proper location because it had not been determined whether there was a library staff dedicated to archive or properly index those documents.

History committee needs to follow up on this. Jose will follow up and the History Committee can present its findings at the 2005 meeting.

Is Steve Seybold interested in serving on this committee? Jose will follow up.

Common names Committee:

In previous meeting notes there is mention of the need to look at woodborer common names. Jose will remind Brytten Steed of this.

Results of Resolutions passed in 2002:

Reprints of Western Forest Insects were completed. The Executive committee would like to acknowledge Tom Hofacker with Forest Health Protection (FHP) in the Washington Office(WO) for his immediate attention to this and the WO FHP for the funding.

Is it available on CD?

The 1995 WFIWC Rapid City proceedings have been published, the Executive Committee recognizes Jose Negron for his efforts in this accomplishment.

Future meetings:

2004 San Diego
2005 Invited by Lorraine to go to Kamloops, B.C.
2006 North American Forest Insect Work Conference

Joel McMillin motioned to adjourn the meeting at 5:00 p.m. Ron Billings seconded the motion and the meeting was adjourned.

TREASURER'S REPORT

Highlights of the past year:

- One scholarship for $500 was awarded.
- We have gained a total of $3,143 into the scholarship CD's. This has come from a challenge issued by one member to the membership of the group, from the silent auction at the Whitefish meeting, from sales of souvenir items, and from any amount in the checking account over $4,000*.
- Interest totaling $242.28 was deposited from the two certificates of deposit into the savings account for use in awarding scholarships.

*All monies received are deposited into the checking account. I keep track of the amounts received from donations and sales whose specific purpose is to go into the scholarship funds. These funds, plus any balance over $4,000 from the checking account, are added to the CD's as they mature each year. After adding the new funds, the CD's are reinvested for another year.

Current Status of Accounts:

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Regular Savings	$1,195.91	These are the funds available for scholarships.
McGregor Fund	$5,120.00	Interest is deposited to regular savings account on a quarterly basis
Memorial Scholarship Fund	$19,395.00	Interest is deposited to regular savings account on a quarterly basis
TOTAL	$29,332.65	

Respectfully, R. Ladd Livingston, Treasurer

SCHOLARSHIP COMMITTEE REPORT

The following is a report of the activities of the Memorial Scholarship Committee since the last WFIWC meeting in Whitefish, MT.

Kevin Dodds, a Ph.D. candidate at Oregon State University, was selected as the 2002 recipient of the Memorial Scholarship. Since the selection process was not completed until after the meeting in Whitefish, this was not announced at the previous meeting but was posted on the WFIWC website. Kevin's selection was the last activity of the original Memorial Scholarship Committee composed of Lorraine McLauchlan (chair), Don Dahlsten, and Mike Wagner. Kevin was invited to deliver a presentation of his research at the meeting in Guadalajara, but declined that invitation.

Darrell Ross was appointed as the new chair of the Memorial Scholarship Committee by WFIWC chair Barbara Bentz at the Whitefish meeting. The committee was reformed to include Don Dahlsten, Terry Shore, and Sandy Kegley. Steve Seybold recently joined the committee to replace Don Dahlsten.

Several items of discussion arose over the past year regarding the Memorial Scholarship including the amount of the award, the number of scholarships to be awarded each year, and whether a plaque should be given to the recipient. Based on the funds in the scholarship account, it was determined that $500 was the maximum sustainable amount that could be awarded each year. That was the amount given to the 2003 scholarship recipient. The committee unanimously agreed that only one scholarship should be awarded each year for several reasons in addition to the obvious financial one. It was also unanimously agreed that a small plaque should be given to the scholarship recipient each year. Plaques were made for the 2002 and 2003 recipients at a total cost of $143.78 or $71.89 each. The plaques will be presented to the recipients at the time that they deliver their invited presentations during the WFIWC annual meetings.

Based on the activities of the Memorial Scholarship Committee over the past year, we recommend the following changes to the description of the scholarship on the WFIWC website:

Under the heading, "Other information relating to the awarding of the WFIWC Memorial Scholarship":
Item 7 should be changed from-
7. The amount of the award may vary from year to year, but is estimated at between $500 to $1,000 US funds.
to
7. The amount of the award will be $500 US funds.

Two additional items should be added:
8. One scholarship will be awarded each year.
9. The scholarship recipient will be given a small plaque in addition to the financial award.

HISTORY COMMITTEE REPORT

A manuscript by Boyd Wickman, Torgy Torgersen and Mal Furniss on the historical photo file that originated at the Portland Forest Insect Laboratory was published in the Fall 2002 issue of American Entomologist (48 (3): 178-185). The article is entitled: Photographic Images and History of Forest Insect Investigations on the Pacific Slope, 1903-1953. Part 2. Oregon and Washington. These photos are now located at La Grande, OR. Part 1 dealt with the file that originated at the Berkeley Forest Insect Laboratory and was published in the American Entomologist in 1998.

The Spring 2003 issue of the American Entomologist contains an obituary for Ronald W. Stark who died in Sandpoint, Idaho, on 9 April 2002. It was written by M. Furniss, Alan Berryman, David Wood and Don Dahsten with help of his daughter, Debra, and information in Ron's Founders Award address that appears in the 1995 WFIWC Proceedings.

The Summer 2003 issue of the American Entomologist contains an article by Furniss entitled: Forest entomology in the northern Rocky Mountains: 1909-1917, as reflected in the correspondence between Josef Brunner and A. D. Hopkins. 49(2): 102-111. It is based on voluminous original correspondence between A.D. Hopkins, Chief of Forest Insect Investigations, Washington, DC, and Josef Brunner in Montana. It conveys the primitive state of entomology in that remote region and the tumultuous relations between the two men and between the Bureau of Entomology and the Forest Service over the relative importance of forest insects and forest fires. As an historical aside, retirement of Furniss in 1982 (Idaho) and of David G. Fellin in 1985 (Montana) ended the continuity of USDA research forest entomologists stationed in the northern Rocky Mountains since Brunner was hired in July 1909.

The Summer 2003 issue of the American Entomologist also contains an obituary for Kenneth H. Wright, an original WFIWC member, who died at Tualatin, Oregon on 3 December 2002. Authors included Russell G. Mitchell and Boyd Wickman.

A manuscript by Furniss and Roy Renkin, Management Biologist, Yellowstone N.P., will appear in the Winter 2003 issue of the American Entomologist. It is entitled: Forest Entomology in Yellowstone National Park, 1923 – 1957. A

time of discovery and learning to let live. It is based on unpublished reports and photos of the former Coeur d' Alene Forest Insect Lab and material in the YNP branch of the National Archives at Mammoth.

Boyd Wickman has written a 16 chapter manuscript entitled: Biographies of H. E. Burke and John M. Miller, encouraged by the Miller and Burke families who provided personal information and photos. The PNW research station is providing typing and financial assistance. It will be reviewed next winter prior to submission for publication. He also is assisting a contract writer for the PNW station to prepare a draft of the History of forest research in Central Oregon. Much of this history centers on the Pringle Falls Experimental Forest, where F. Paul Keen began research in1931 that resulted in the Keen tree classification by which ponderosa pine trees could be classified according to their susceptibility to bark beetles. Those who have communicated with Boyd will be incredulous to learn that he has recently taken to e-mail. His address is bgwickman@bendbroadband.com.

M. Furniss, aware of the thinning ranks of his generation, devoted considerable time to organizing and culling his photo files and those of his brother, Robert L. Furniss (1907-1982). Their color slides now number about 4800 and 2800, respectively. They are of considerable historical interest, dating from the 1940s, including various people; research; work in Mexico, Alaska, and Norway; and RLF's assignments to Japan during 1948-1950. Other subjects include insects, scenics, and recreational activities. Both files also include many black and white photos.

Finally, mention must be made of the long-awaited publishing this year of the proceedings of the 1995 Rapid City Work Conference. The genesis for this accomplishment took place during the April 2002 WFIWC at Whitefish, MT., just a few weeks after Ron Stark's death. He had given his Founders Award address at Rapid City but that Proceedings had not been published by the Program Chairperson. A few "Silver-back" colleagues of Ron gathered for dinner and proposed that now was the time, if ever, to put together a Proceedings including his entertaining and historically significant address. Subsequently, Dave Wood made such a motion at the final business meeting and current WFIWC Chairman Jose Negron proceeded to solicit material from attendees of the 1995 Conference. Fortunately, Ron had provided your History Committee with a copy of his address at their request.

Submitted by M.M. Furniss and B.E. Wickman

FOUNDER'S AWARD COMMITTEE REPORT

Representing the Founder's Award Committee, it is my pleasure to formally announce the selection of Dr. Don Dahlsten as the 2003 recipient of the WFIWC Founder's Award. Due to Don's very unfortunate and untimely passing, most are aware of Don's selection. Still, this will provide the "official" announcement for WFIWC records. As we have discussed, a "memorial" address will be delivered at the combined WFIWC/WIFDWC meeting in San Diego in April 2004. Details regarding that address are not yet available.

Dr. John Schmid, the 2002 Founder's Award recipient will address the conference in Guadalajara in November 2003. I am very sorry I will not be at the meeting this year; and I am not sure which members of the committee may be. At any rate, I know you will convey our most sincere congratulations to John when you introduce him at the time of his address.

At an appropriate point in one of the business meetings, you might remind conference attendees that we will be accepting nominations for the 2004 Founder's Award until the end of December 2003. Details are available on the WFIWC website.

My sincerest regards to you and other members of the Executive Committee. I hope you have a very successful meeting this year.

Respectfully submitted, Ken Gibson, Chair

Unapproved Minutes of the 2003 Final Business Meeting:

FINAL BUSINESS MEETING
6 November 2003

Jose Negron called the meeting to order at 5:30 p.m.

Sheri Smith read the minutes of the 2003 Initial Business Meeting.

New Business:

Item 1. There was general discussion involving the need to update the list of names of who is on each of the WFIWC committees. Sheri Smith will follow up on this.

Item 2. Karen Ripley explained that the Scholarship Committee is actually split into two groups: the Award Committee and Fund Raising Committee.

Item 3. Ron Billings suggested making the digital pictures from this meeting available on a CD for $5 with all proceedings going to the Scholarship Fund. Everyone thought this was a good idea. Thanks to Ron for being the photo guy!

Item 4. Karen Ripley reported that the Silent Auction was a big success and netted $350.00. She thanked everyone who donated items. Jaime Villa donated the required $50.00 to have Don Dahlsten's name added to the "In Memory of" part of the Scholarship Award plaque. Ron Billings donated the $50 to have Ken Wright's name added as well. Karen also mentioned that the plaque would be on display at the banquet tonight. It was discussed and decided that the Silent Auction will continue as part of the annual WFIWC meeting.

Item 5. There was discussion regarding where the appropriate place is to house the Scholarship Award plaque. It was decided that it will remain at its current location at the Pherotech office with Jennifer Burleigh.

Item 6. There was mention in the 2002 meeting notes of the need to have the common names committee work on common names for some of the wood borers. Iral Ragenovich will discuss this among the committee and report back in 2004.

Item 7. Nancy Gillette agreed to take the lead for updating Western Forest Insects. Jan Volney and Nancy will develop a proposal for the update and present it at the 2004 meeting.

Item 8. Selection Committee: The Selection Committee chose Danny Cluck and Jennifer Burleigh as Councilors starting in 2004. There was a unanimous vote.

Item 9. Conference locations: The 2004 Joint WFIWC / WIFDWC will be held on April 26-30 in San Diego, California. Program Co-Chairs are Steve Seybold (sseybold@fs.fed.us), Everett Hansen (hansene@bcc.orst.edu, 541-737-5243), and Hadrian Merler (Hadrian.Merler@gems8.gov.bc.ca, 250-558-1743). Sheri Smith (ssmith@fs.fed.us, 530-252-6667) is the Local Arrangements Chair. This joint work conference will be hosted at the Holiday Inn San Diego-on the Bay.

2005 Invited by Lorraine to go to Kamloops, B.C.

2006 North American Forest Insect Work Conference

Item 10. Jose reminded everyone to have students apply for the Scholarship Award. He also noted that the nominations for the 2005 Founder's Award recipient would be open through December 2003.

Item 11. There were no resolutions.

Item 12. A moment of silence was observed in honor of Don Dahlsten and Ken Wright. Tom Eager read the obituary for Don Dahlsten.

Pat Shea motioned to adjourn the meeting at 6:15 p.m. Tom Eager seconded the motion and the meeting was adjourned.

Obituary for Don Dahlsten
(Born 8 December 1933, Died 3 September 2003)
(Prepared by Pat Shea and Tom Eager, read by Tom Eager)

In Memory of
Dr. Donald Lee Dahlsten
Professor of Forest Entomology
University of California, Berkeley

It is with great regret that we announce the passing of our good friend and colleague, Don Dahlsten, on September 3th, 2003 at the age of 69. Don died at the Alta Bates Medical Center in Berkeley after a 2-year battle with a rare form of skin cancer.

Over the course of a 40-year career, Don developed a world-wide reputation as a respected leader in forest entomology and related fields. His research focused on the development of ecologically sensitive methods of managing insects that feed on trees in forest and urban environments.

We are all aware of his pioneering work regarding the biological control of eucalyptus psyllids, but Don distinguished himself with research on the population dynamics of bark beetles and the factors that attract their natural enemies. His other projects included research on how the methods developed to control of Pierce's disease impacted riparian habitats, description of the life history and development of control strategies of elm leaf beetles, and the ecological impact of the sudden oak death pathogen, a fungus-like algae that has killed tens of thousands of oak trees throughout California.

Don was a true naturalist and had deep interest in a wide range of organisms. He maintained one of the largest long-term databases of insectivorous birds in California's forest and riparian areas, and recently contributed a 20-page chapter on the biology of the chestnut-backed chickadee for the encyclopedia "Birds of North America".

Don was known, respected and loved by colleagues around the world. He worked and traveled extensively in France, Romania, Australia, Chile, and Brazil, and was one of the first biologists to work in China following its opening. Most recently Don was in Mexico assisting in the establishment of an insectory developed to produce parasites of the eucalyptus psyllid.

Don was noted as a dedicated educator and was appointed as Associate Dean for Instruction and Student Affairs at U.C. Berkeley's College of Natural Resources in 1996. He advised 39 graduate students during his tenure, but he also taught literally thousands of natural resource, entomology and forestry students in his popular undergraduate courses. His influence extended far beyond the campus as he often addressed professional and civic groups, and he developed outreach programs through the College as well as through the University of California's interactive University Project.

His efforts and outstanding contributions earned him earlier this year the UC Berkeley Distinguished Service Award and the College of Natural Resources Citation. Don has received numerous other honors throughout his distinguished career, including the UC Berkeley College of Natural Resources Outstanding Teaching Award in 1995. In addition to winning these many honors, perhaps Don was most proud of being named the 2003 recipient of the Western Forest Insect Work Conference Founder's Award for Contribution to Forest Entomology.

Don was an ardent participant in both the Western Forest Insect Work Conference and the California Forest Pest Council. He greatly enjoyed these gatherings and served in virtually every capacity in both organizations including Chair, Secretary, and Councilor, in addition to his contributions on Special Committees, and as Local Arrangements and Program Chair. Also, let it not be forgotten that he was an multiple recipient of the "Ethical Practices" award given in past times by the Western Forest Insect Work Conference.

To many members of the California Forest Pest Council Donald Lee Dahlsten was not only a teacher, mentor and colleague but also a dear and special friend. He will be sorely missed.

Standing: Jennifer Burleigh, John Schmid, Joan Schmid, Andy Eglitis, Pat Shea, Irene Mata, Stephen Mata, Sheryl Costello, and Tom Kolb. **Sitting**: Tim McConnell, Eric Smith, Eréndira Lopez Gómez Tagle, Eduardo Jiménez Quiroz, Danny Cluck, Dwight Scarbrough, Keith Douce, and Sky Stephens.

Standing: Carlos Rodriguez Chinchilla, Matt Jedra, Carl Jorgensen, Terry Rogers, Natacha Guerard, Fernando Cortez Guido, Jose Luis Holguin Nuñez, and Ivanhoe Mass Gonzalez. **Sitting**: Debra Allen-Reid, Guillermo Sanchez Martinez, Liz Hebertson, Alejandra Perez Manzo, Jaun Luis Juarez Léon, Oscar Ortiz Horta, Jesus Raya Pineda, and Frank Antonio Kelso Bucio.

Standing: Ignacio Vazquez Collazo, John Stein, Efrain Hernandez Perez, Roberto Hernandez Martinez, Iral Ragenovich, Tom DeGomez, Harley Nonato de Oliveira, and William Ciesla. **Sitting**: Nancy Gillette, Sylvia Cota, Jesus Cota, Sheri Smith, Elvira Matilde Petray, Hideji Ono, Tom Eager, and Jose Negron.

Standing: Dan Miller, Anthony Cognato, Isabel Leal, James Ellenwood, Borys Tkacz, Omar Maldonado Creollo, Pedro Montufar, and Beth Willhite. **Sitting**: Yolanda Salinas, Remigio A. Guzman Plazola, Patricia Lucero Garcia Garcia, Pedro Medrano Lopez, Tim Work, Francesco Bonilla, Silvia Sanchez, and Karen Ripley.

Standing: Diana Six, Timothy Paine, Allan Bullard, Steven Burke, Cam Oelschlager, Jorge Macias Samano, Idalia Colomo González, and Beatriz Gracia Franco. **Sitting**: Karen Clancy, Joel McMillin, Carroll Williams, Rebecca E. Gonzalez Medina, Laura Melisa Vazquez G., Lilliana Gonzalez, Alicia Niño Dominguez, and Benjamin Moody.

Standing: Robert Mangold, Armando Equihua Martinez, Carlos Magallon Manneau, David Quiroz Reyagadas, Jose G. Salas, Cristobal Sayago Pozos, Ernestor Ilizaliturri Pardo, and Jose Ramon Mire Montiel. **Sitting**: Alejandra Cruz Garcia, Edith Estrada Venegas, Connie Mehmel, Martha Olivia Herrera Fernández, Juan Cruz Aniéles, Dave Wakarchuk, Tom Stokes, and Michael Wagner.

Standing: Rodolfo Campos Bolaños, Brytten Steed, Hugo Miranda, Ricardo Israel Sanchez, Bob Haack, Juan Olivio Martinez, and Monica Gaylord. **Sitting**: Cheryl Miller, Benjamin Smith, Carlos Wilcken, Oscar Trejo Ramìrez, Alejandro C. Camacho Vera, Francisco R.Velasco Rodas, Jaime Villa Castillo, and René Alfaro.

Group Photographer: Ron Billings